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The effects of political factors, industrial mix and tax competition on state tax revenue composition : theoretical and empirical evidence

Sanela Porca
University of Tennessee

To the Graduate Council:

I am submitting herewith a dissertation written by Sanela Porca entitled "The effects of political factors, industrial mix and tax competition on state tax revenue composition : theoretical and empirical evidence." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Economics.

William F. Fox, Major Professor

We have read this dissertation and recommend its acceptance:

Matthew N. Murray, Donald J. Bruce, Daniel P. Murphey

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Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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The Effects of Political Factors, Industrial Mix and Tax Competition on State Tax Revenue Composition: Theoretical and Empirical Evidence

A Dissertation Presented for the
Doctor of Philosophy Degree

The University of Tennessee, Knoxville

Sanela Porca
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DEDICATION

This dissertation is dedicated to my mother
Ferida (doughter of Rasim and Djula) Hodzic

I am forever thankful to my mother for teaching me how to work hard and for letting me follow my dream. To you, I own so many things in my life
To you, I say thanks and I love you mom!

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ABSTRACT

A comparison of state tax sources reflects different tax systems including differing mixes and levels of taxes, different tax bases and varying rate structures among the fifty states. Five states do not impose general sales taxes while six collect more than 50% of tax revenue from this source; nine states do not impose broad-based personal income tax while four collect more than 50% of tax revenue from this source. These patterns suggest several questions including: Why do states rely on some taxes more than others, how do states decide on the mix and magnitude of tax revenues and what factors influence tax structure decisions?

The purpose of this research is to examine the factors determining the composition of tax revenues across the fifty states between 1979-1999. The focus is on the three major tax sources: general sales, personal and corporate income taxes. The research is an empirical investigation of the tax shares and how policy preferences, economic shifts, continuous voter support and competitive pressures influence them across the states. The analysis is designed to consider how three broad influences affect marginal decisions on the use of these tax instruments. First, policymakers consider the preferences of interest groups, (income earners, retailers and businesses) in choosing between the major tax instruments. Second, they consider the state's industrial mix and how revenues will respond to the level of economic activity located within their jurisdictions. Finally, policymakers consider tax competition, made easier by cross-border shopping and the rise of electronic commerce, when setting their tax structure.

The study takes an initial step toward filling a lack of comprehensive characterization of the tax revenue composition of the fifty states. The empirical results

uncover unique responses of tax portfolios to economic, political and tax competition developments. These three aspects of tax revenue portfolios affect the balance of state tax revenue and produce widespread state budget shortfalls. State policymakers can utilize the findings of this study when analyzing their tax revenue compositions. The current study can serve in finding a better solution to states' budget problems. The provided results could help evaluate the reliance on particular tax source and develop new tactics that enable state policymakers to meet their budget needs.

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Chapter 1

Introduction

1.1 Overview of Issues

In the last several decades, state governments have become highly dependent on their own revenue sources. In 1979, about fifty percent of all states' general revenue was provided by state taxes, while in 1999, seventy-six percent of states' general revenue came from tax revenue. The remaining fifty and twenty-four percent came from intergovernmental aid. A careful look at state tax revenue composition reflects different tax systems and various mixes and levels of taxes, different tax bases and rate structures among the fifty states. These differences in tax bases, rates and the overall tax structure result in vastly different tax revenue mixes. For example, nine states do not impose a broad-based personal income tax while four states collect more than fifty percent of their tax revenue from this source; five states do not impose a general sales tax while six collect more than fifty percent of tax revenue from general sales tax. Over time, the relative importance of various taxes has changed. For example, during the last several decades states have significantly increased their reliance on personal income taxes, while their reliance on corporate income taxes has decreased.[1]

The interstate and intertemporal patterns of state tax revenue mix reveal several questions: Why do states rely on some taxes more than others? How do states decide on the mix and magnitude of tax revenues? What factors influence tax structure decisions?

[1] Table 1 in Appendix 1 gives information on states' tax revenue mixes for the three most used tax sources – general sales tax, personal income tax and corporate income tax. These statistics are for the years 1979, 1989 and 1999.

The purpose of the current research is to find the answers to those questions by examining tax revenue compositions across the fifty states within the 1979-1999 time frame.

The term tax revenue composition describes the tax revenue portfolio, which is viewed as the division of tax revenue among different tax sources (tax shares). This analysis of state tax revenue composition is particularly important given that budget deficits and fiscal imbalances force state governments to stretch resources and cut public services, including K-12 education. To better illustrate states' tax revenue problems, here is a sample of today's (Spring, 2002) tax headlines:

- Alaska House Approves Personal Income Tax;
- Arizona Faces Continuing Budget Problems in 2002;
- Arkansas Budget Troubles to Continue in 2002;
- Criticism Mounts Against Florida Sales Tax Reform Proposal;
- Illinois Receives More Bad Budget News;
- Massachusetts House Approves $1 Billion Tax Hike Package;
- Michigan Senate Finance Panel OKs Amendments to Sales Tax Act;
- North Carolina's Budget Shortfall Expected to Hit $ 1 Billion;
- Pennsylvania Lawmaker: Replace Property Tax With Local Income Tax;
- Wisconsin Governor Takes Aim at Deficit.[2]

Some tax analysts suggest that a lack of diversity in tax revenue composition results in a revenue-unproductive tax system which in turn causes fiscal stress (Tannenwald, 2001). Likewise, this study's argument is that a solution to state revenue problems comes from analyzing state tax revenue composition and its responsiveness to changes in the private economy, tax competition from other states and political preferences. Therefore, this study considers these three broad influences and their effects

[2] World Wide Web <http://taxbase.tax.org>

on marginal decisions regarding the use of tax instruments and therefore the resulting revenues.

1.2 Contributions of the Current Study

The current study argues that policymakers influence the tax revenue composition (the mix and magnitude of tax collection) by making changes to the structural features of taxes, that is to their tax rates, tax bases and/or laws that define tax exemptions or deductions. The level of tax revenue collection and resulting tax shares are thus products of these changes and serve as proxies for the tax revenue portfolio that policymakers want to employ. Consequently, the current analysis of states' tax shares reflects the policymakers' preferences for reliance on particular tax sources and therefore the state tax revenue mix.

In order to obtain insight into the reasons for state tax revenue composition, the current study analyzes *three* major tax sources and their respective tax shares: general sales tax, personal income tax and corporate income tax.[3] Combined, these three tax sources account for almost seventy-five percent of state tax revenue. These three tax sources also concern preferences of three groups of taxpayers: income earners, retailers and businesses. Given that policymakers are well aware of different tax preferences among taxpayers, they make changes to their tax revenue composition in such a way as to increase or decrease state reliance on a particular tax source and thus please one group of taxpayers while displeasing others. In addition, this study argues that different economic

[3] Definitions and detailed descriptions of general sales, personal income and corporate income tax shares are given in Chapter 2. The current study analyses states' reliance on these three taxes *only* and it does not consider a state's reliance on other tax sources.

conditions and competitive pressures across states influence state tax decisions. The policymakers consider the state's industrial mix and how revenues respond to the level and kind of economic activity located within their jurisdictions. For example, they also consider the tax competition that is made easier by cross-border shopping and the rise of electronic commerce. All of these considerations play a very important role in state tax revenue composition. Goal of the current research is to disintegrate these various influences and present state policymakers and researchers with the ways of making tax systems more productive.

The current study conducts a theoretical and empirical analysis of the three tax shares. A system of tax share equations and their respective tax rates is estimated to consider how political factors, states' economic structure and tax competition affect marginal decisions on state use of the three tax sources. This study extends the existing literature in a number of ways:

1. By analyzing tax revenue composition across fifty states during the twenty-one year period (1979-1999);
2. By examining state tax revenue composition from (i) political economy and (ii) tax competition perspectives. In terms of the political economy approach, the current study defines and estimates political costs for the three tax revenue sources. In terms of interstate tax competition, the study allows for different kinds of tax competition among geographic neighbors. The difference in kinds of tax competition is based on differences in the nature of these taxes (e.g. consumption vs. income taxes);

3. By accounting for state production mix and determining the effects of seven different industries on state reliance on the three tax sources;
4. By examining the effects that the interdependence among state tax rates has on the level of state tax rates as well as by identifying the border market characteristics that affect the level of state tax rates.

This study takes a first step toward filling a lack of comprehensive analysis of the tax revenue composition of the fifty states. In addition to the above contributions, the current study has some limitations as well. The major limitation is the inability to model *all* components of the tax revenue portfolio. The framework developed by this study does not account for other components of state tax revenue composition (components other than general sales, personal income and corporate income taxes). Since the three tax shares do not sum to one, the analysis does not provide the *whole* picture of tax revenue portfolio and its determinants. However, the current framework can be extended to deal with other tax sources.

The current study is divided into seven chapters. Chapter 2 defines and discusses different tax sources. Chapter 3 summarizes the existing literature on government behavior, business location and interstate tax competition. Chapter 4 presents the conceptual framework used by the current study. The empirical model and data descriptions are given in Chapter 5. Chapter 6 discusses estimating techniques used by the current study and presents the empirical findings as well as the results of several robustness tests. Chapter 7 gives concluding remarks and suggests contributions, limitations and further extensions for this study.

Chapter 2

Individual Tax Sources

2.1 Introduction

Due to the fact that own tax sources are very important for the states and that state governments account for a large level of tax revenue collection in the United States, this study analyzes the changes in tax shares across the fifty states during the 1979-1999 period. The tax shares presented in this work are calculated from the U.S. Bureau of the Census data.[4]

During the last several decades, the relative importance of various tax sources in state tax revenue portfolios has changed. Casual observation of changes in tax shares during the 1979-1999 period and across the states suggests that states made shifts from one tax to another. For example, during the examined period, the state of Connecticut decreased its reliance on the general sales tax from 43 to 33 percent, while its reliance on the personal income tax increased from 4.8 to 37.5 percent. Similarly, during the same period of time, in Indiana and Missouri the general sales tax share went from 41 to 34 percent and from 39 to 32 percent, respectively, while the personal income tax share increased from 22 to 38 percent (IN) and from 27 to 42.4 percent (MO). The changes in tax revenue portfolios are important for tax policy analysis, so the definitions and descriptions of several major tax sources as well as the patterns of these changes are discussed in this chapter.

[4] The Census reports state tax revenue in terms of gross collections minus tax refunds during the same period.

2.2 Personal Income Tax Share

The personal income tax is established on the "ability to pay" concept. Today, the personal income tax is one of the most important sources of tax revenue for the states. It is defined as a tax on individuals' net income which often includes special types of income such as interest, dividends, income from intangibles and so on. Over the last several decades, the states have significantly increased their reliance on the personal income tax. In 1979, the state personal income tax share averaged twenty-six percent, ranging from fifty-eight percent in Oregon and forty-four percent in Delaware, to eight states (Florida, Nevada, New Hampshire, South Dakota, Tennessee, Texas, Washington and Wyoming) that did not impose a broad-based personal income tax. Due to different changes in the private economy over time, as well as the responsiveness of personal income taxes to economic changes, many states have made changes to their tax revenue portfolio. In 1999, the state personal income tax share averaged thirty-five percent; this time ranging from sixty-nine percent in Oregon and fifty-five percent in Massachusetts, to nine states (now including Alaska) that do not impose broad-based personal income taxes. Changes in states' reliance on this source of tax revenue for period 1979-1989 and 1989-1999 are shown in Map 1 in Appendix 2. Generally, the darker the shading, the larger the increase.

2.3 General Sales Tax Share

The Census defines the general sales tax as a tax applicable (with only specified exceptions) to all types of goods and services, whether at a single rate or at classified rates. During the 1970s and 1980s, the general sales tax was the largest single source of

tax revenue at the state level. It averaged thirty-two and thirty-three percent of total state tax revenue in 1979 and 1989, respectively. Florida, Nevada, Tennessee and Washington collected more than fifty percent of their tax revenue from general sales taxes during this period. However, the general sales tax was not a source of revenue for five states (Alaska, Delaware, Montana, New Hampshire and Oregon). Things changed slightly during the nineties when the personal income tax became the largest source and the general sales tax became the second largest source of tax revenue. In 1999, the general sales tax share averaged thirty-three percent. States like Connecticut, Indiana and Missouri, to name only a few, have significantly decreased their reliance on general sales taxes and have increased the reliance on personal income taxes. According to tax analysts, some of the reasons for this switch are the regressivity of general sales taxes as well as their responsiveness to fluctuations in business cycles. Map 2 shows the changes in general sales tax shares during the 1979-1989 and 1989-1999 periods and across the states. Again, darker shading represents a larger change.

2.4 Corporate Income Tax Share

The corporate income tax is imposed on the net income of corporations and sometimes on the net income of unincorporated businesses. The corporate income tax is an important source of state tax revenue, although it is somewhat decreasing in its significance. In 1979, the corporate income tax share averaged ten percent while in 1999 this share averaged six percent. Rightfully or not, policymakers often fear that corporate income taxes can alter state economic development. Therefore, they frequently use corporate income tax breaks as a mean of attracting new businesses, competing with

other states and boosting economic development. Four states, Nevada, Texas, Washington and Wyoming, do not rely on corporate income taxes at all, while Alaska and New Hampshire collect twenty-four percent of their tax revenue from this source. Similarly, Delaware, Indiana and Michigan collect about eleven percent of their tax revenue from corporate income taxes. The changes in states' dependency on this source of tax revenue are shown in Map 3. Here, darker shading represents a smaller reduction or, for a few states, an increase.

2.5 Other Tax Sources

Besides the taxes already discussed, several other taxes contribute to state tax revenue. For instance, selective sales taxes are imposed on sales of particular commodities or services of particular businesses, separately and apart from the application of general sales taxes. Some examples include alcoholic beverages, tobacco products and gasoline. Selective sales taxes are a very important source of revenue for state governments. However, during the last several decades, they have been decreasing in significance, as some other sources have become more dominant. For instance, the selective sales tax share averaged nineteen percent in 1979 and fifteen percent in 1999. Variation in the use of this source is quite marked and ranges from a high of fifty percent in New Hampshire to less then eight percent in California. Changes in the importance of the selective sales tax share during 1979-1989 and 1989-1999 are shown in Map 4.

In addition to selective sales taxes are other taxes such as business license fees (taxes exacted as a condition to the exercise of a business or non-business privilege, at a flat rate or measured by such bases as capital stock, capital surplus, number of business

units, or capacity); severance taxes (taxes imposed distinctively on removal of natural products from land or water and measured by value or quantity of products removed or sold such as oil, gas, other minerals, timber, fish, etc.); and death and gift taxes (taxes imposed on transfer of property at death, in contemplation of death, or as a gift). State reliance on these additional taxes varies significantly across the states. For instance, during the nineties, states like Alaska and Delaware collected more than sixty percent of their tax revenue from these additional tax sources. However, during the same period, eight states (Arizona, California, Georgia, Hawaii, Indiana, Massachusetts, New York and Utah) collected less then ten percent of their tax revenue from these sources. Changes in taxes other than personal income, general sales, corporate income and selective sales taxes during 1979-1999 are shown in Map 5.

Chapter 3

Background and Prior Literature

3.1 Introduction to Prior Literature

The existing literature on tax revenue composition and development of revenue systems is very limited. Hinrichs (1966) and Musgrave (1969) initiated the theory of tax revenue structure and economic development with different approaches. For instance, the focus of Hinrichs' work was the relationship between the stages of economic and fiscal development. On the other hand, Musgrave put stronger emphasis on administratively simple ways of collecting tax revenue as well as on changing tax handles to which the revenue system is attached. Similarly, Tait, Gratx and Eichengreen (1979) as well as Tanzi (1987) gave empirical evidence on the relationship between the evaluation of tax revenue and economic development in developing countries. Hettich and Winer (1987) and Gade and Adkins (1990) analyzed revenue structures of Canada and the United States, respectively. The attempt of the present study is to make a contribution to tax revenue analysis by explaining three major determinants of state tax revenue portfolio – political, economic and tax competition forces. In order to do so, this chapter summarizes relevant findings of three different sets of literature: literature on government behavior, tax competition and business location literature.

3.2 Literature on Government Behavior

To date, research devoted to government behavior has attempted to explain the evolution of tax revenue systems by using different theoretical frameworks. The question posed by this study is: *Which theoretical foundation on the structure of tax revenue*

systems best describes the altruistic yet self-interested, rational government? In order to answer this question, several different models of government behavior have been analyzed. Some constrain tax structure by the institutions of representative government while others consider government as "Leviathan" with unlimited power to tax. However, the current study relies on the findings of the *probabilistic voting* literature as well as the *portfolio* choice models.

The *probabilistic voting* models are founded on the spatial models of electoral competition. The probabilistic voting models start from the assumption of a representative democracy with probabilistic voting in which voters choose between the candidates on the bases of the policies that they propose to implement. The policymakers perceive that there is a probability that voter *i* will support his platform. Therefore, each policymaker seeks to maximize his expected number of votes subject to the structure of the private economy (Coughlin & Nitzan, 1981; Hettich & Winer, 1988; Coughlin, 1992). Expected vote maximization is based on the view that political outcomes can be described as equilibrium in the sense that officials balance voters' heterogeneous interests (Chernick & Reschovsky, 2000). Given that the responses of the electorate cannot be perfectly predicted by the candidates, the probabilistic description of the voters' choice behavior seems reasonable and realistic (Calvert, 1986). In the current study, the tax revenue portfolios are presumed to be a result of probabilistic voting. Thus, the policymakers that determine tax revenue compositions are assumed to maximize voters support subject to the structural feature of a state's economy and tax competition with other states.

Besides the probabilistic voting literature, the findings of the *portfolio* choice models lead some of the current study's arguments. White (1983) pioneered the *portfolio* choice model of tax structure. The centerpiece of the portfolio approach is the *derivation of a frontier that depicts the trade-off among characteristics of a state's tax system.* Gentry and Ladd (1994) extended White's methodology and incorporated a broad set of characteristics and directly compared two states. They examined how a state's economy and the nature of its taxes affect the chosen tax revenue mix. Braun and Otsuka (1998) examined the contributions of a state's economic condition and the tax structure to the *growth and variability* of tax revenue flow. Their focus is on how the tax structure interacts with the state economy to constrain the choices obtainable to the government officials. Given the interest of the current study to analyze state tax revenue mix from political economy and tax competition aspects (and not stability, efficiency, growth and/or complexity of tax revenue portfolio), theoretical foundations of the portfolio choice models are not going to be a centerpiece of the current study. The current study argues that a more comprehensive analysis of tax revenue portfolio must include the political and tax competition elements that are embodied in the tax decisions. Therefore, the following analysis of state tax revenue composition is only *partially* relying on portfolio choice literature.

Optimal taxation theory offers complement to portfolio approach. Optimal analysis uses a general equilibrium approach to focus on the trade-off between equity goals and the dead weight loss of taxation. The integration of equity and efficiency goals requires policy makers to determine a tax structure that minimizes deadweight losses for particular distributional goals. The optimal taxation literature supports selective

consumption taxation rather than income taxation using an inverse elasticity rule (Ramsey, 1927; Diamond & Mirrlees, 1971; Stiglitz & Boskin, 1977; Shoven & Whalley, 1977, 1992). The level of abstraction limits practical implementation of optimal taxation theory. Although the optimal taxation provides excellent guides to the design of tax revenue portfolio, it assumes that policymakers have no political agenda of their own. Given the interest of the current study in testing the effects of the political forces on state tax revenue composition, the reliance on the optimal taxation literature is going to be very limited and primary focused on policymakers objective to minimize the total excess burden of proposed tax revenue portfolio.

Two additional, widely utilized approaches to government behavior are the *median voter and Leviathan* theorems. The models of collective choice utilize *the median voter* theorem of Duncan Black (1958) and apply it to the choice of tax rates and thus tax shares. In median voter models, each voter can propose amendments to the existing status with the intent to achieve his/her preferred outcome. In this traditional approach, government maximizes the preferences of the median voter through institution of majority rule under the assumption that these preferences are single-peaked and unidimensional. Given the interest of the current study in analyzing the determinants of the tax revenue portfolios, that are, by their nature, multidimensional, the median voter assumptions would introduce a degree of inconsistency into the tax revenue decisions.

A different set of literature suggests evolution of tax systems, and therefore the resulting tax revenue portfolio, to be a product of bureaucrats' revenue-maximization behavior. According to this approach, the multidimensional tax structure is used by *"Leviathan"* in order to maximize total revenue and to discriminate among taxpayers

(Brennan & Buchanan, 1980). Further, the electoral process is not sufficient to confine the "Leviathan" and therefore, the government should be constrained by constitutional limits. Similar to a utilitarian approach, this method relies on strong assumptions. In reality, government officials face a trade-off in setting tax systems to fund a desired level of public goods and they are concerned about voters' opinions. Policymakers are well aware that in order for them to remain in office, they have to worry about the voters' support.

The above mentioned literature contributes greatly to the public finance field. However, there are three open questions to deal with. These questions are:

1) *the consideration of all major factors that drive the tax decision (e.g. structural changes of private economy and the resulting industrial mix);*

2) *the specification of the preferences of the rational policymakers (e.g. the policymaker's objective to maximize voters' utility as well as voters' support);*

3) *the role of the fiscal interaction between governments of the same level – horizontal competition.*

The current analysis intends to utilize portfolio and probabilistic voting theories and combine them with the business location and tax competition theories. In particular, the current study follows Hettich and Winer's (1988) approach to government behavior. Hettich and Winer's approach views government as neither as altruistic nor as Leviathan as the two polar approaches to government behavior suggest. Hettich and Winer extend traditional models of welfare maximization *by considering altruism in a rational choice framework.* In addition, they focus on political equilibrium and their implications for resulting tax shares and therefore tax revenue portfolio. In Hettich and Winer's approach

the government maximizes its utility function by maximizing voters' support function and tax revenue. This approach allows for simultaneous consideration of politicians' preferences, characteristics of state private economy and tax competition with neighbors.

3.3 Literature on Business Location

As an economic factor, businesses are necessarily self-interested in the sense that they seek to maximize profits. Therefore, a location decision of a given firm depends on its profitability at a particular location as well as on its profitability at alternative sites. Each location provides a unique combination of market and cost characteristics, taxes, public goods and services, amenities, which in turn result in different levels of business profitability. On the other hand, diverse businesses and their characteristics contribute differently to the state's private economy and therefore to tax revenues available to state governments. Thus, different businesses contribute differently to a state's tax domain and therefore tax revenue mix. On this basis, the characteristics of state economy are additional reasons for the differences among states' tax revenue portfolios.

The literature relevant to this essay has examined whether interdependence between the level of economic activity and taxation exists. The classical, regional science approach to business location stresses the importance of sources of inputs and markets for outputs at exogenously determined locations, as well as the transportation costs of these inputs or outputs. Such an approach does not consider taxes as a major factor in firm location (Clarton, 1983; Carrol & Wasylenko, 1994; Hines, 1996). However, the public finance literature has developed its own approach. Its theoretical and empirical attention has focused on fiscal differences between the states and interstate

tax competition as determinants of business location decisions. Bartik (1994) and Wasylenko (1997) summarized the literature on whether taxes are a significant determinant of regional and local economic development. The authors reported various conclusions on the relationship between economic growth and taxation. Bartik suggested that the interregional elasticity of economic activity with respect to taxes is between -0.1 and -0.6, and on average, it is -0.3. Wasylenko's findings suggest that the interregional elasticity is -0.2. Wasylenko's review of the literature suggests that taxes have a small effect on interregional location behavior. The majority of findings suggest a very small influence of any government policy on the location decisions. However, despite the differences in some empirical findings, in general, there is an agreement between the public finance and business location literature. Both agree that taxation has *small* effects on business location and so is *unlikely* to substantially stimulate or initiate development. This is because, for most businesses, total taxes are a much smaller proportion of expenditures than are capital or wage costs. Therefore, state taxes *should* carry some weight mostly at the final stage of location decision-making given the small interregional elasticities of economic activities with respect to taxation. Thus, some authors consider state taxes exogenous to regional economic development (Fisher & Peters, 1997). This conclusion is very important for the current study given that it eliminates the possibility of endogenous effects of industrial mix on state tax revenue portfolio.

3.4 Literature on Tax Competition

Many economists have recognized the importance of the structure of the tax revenue system and used its different elements in order to explain the ways tax structure

and tax revenue portfolio operate. Previous studies indicate factors that influence the tax mix to include: tax exporting (Gade & Adkins, 1990; Morgan, Mutti & Rickman, 1996), tax competition (Kanbur & Keen, 1993; Fuest, 2000), elasticity of the tax system (Oates, 1975;) and complexity of the tax structure (Wagner, 1976; Warskett, Winer & Hettich, 1998). As stated earlier, one of the primary focuses of this study will be on *tax competition.* Given the ease of movement and open borders in a decentralized country like the U.S., the occurrence of tax competition might cause changes in tax revenue portfolio and planning difficulties for government officials. There are two concepts of fiscal competition that occur between the governments: *vertical competition*[5] and *horizontal competition.* Given the interest of the current study to analyze different tax shares and their patterns across the states, the focus is on horizontal competition. Horizontal competition refers to competition between governments of the same level, e.g., it results in various sorts of externalities such as transfer of tax burdens and overlapping powers.

In the existing public finance literature, tax competition attracts much attention through the ability of states to impose taxes on nonresidents and thus to collect additional tax revenue. Researchers give different arguments for and against tax competition. Some suggest that a variety of fiscal policy instruments can boost economic development, diversify communities and lead to greater government efficiency and innovations (Gordon, 1983; Fisher, 1991; Gordon & Wilson, 2001; Perroni & Scharf,

[5] Vertical competition is a division of functions and powers among levels of governments and it refers to their fiscal competition for tax revenue (Breton & Scott, 1978; Breton 1996). Vertical competition distorts the spending priorities of recipient jurisdictions (Gramlich, 1977) and underlines promotion of fiscal illusion (Romer & Rosenthal, 1980).

2001). Others argue that it can increase the mobility of factors of production, lower the size of government and the level of public goods and services provided (Keen & Marchand, 1997; Sinn, 1997; Hoyt & Jensen, 2001).

In addition, researchers have taken theoretical and empirical approaches to the analysis of tax competition. Mintz and Tulkens (1986) and Kanbur and Keen (1993) developed a theoretical approach to fiscal competition and used general and partial equilibrium models to examine the tax revenue that arises from competition between jurisdictions. Parallel to this theoretical literature, empirical research examines the effects of tax competition on tax revenues, tax rates and public expenditures. Hewett and Stephenson (1983) looked at the effect of rate changes in Iowa's income, sales, corporate income and motor fuel taxes on its tax revenue. Similarly, Case, Hines and Rosen (1989) and Besley and Case (1995) originated the *yardstick competition* approach to tax competition theory. They tested the hypothesis that voters compare a tax-expenditure package in their state with that of their neighbors. The yardstick competition results in pressure for policymakers to provide services at the lowest cost. The findings of both theoretical and empirical works on tax competition suggest that interdependence exists between a state's tax revenue, its own tax rates and the tax rates of competing states.

3.5 Overview

As stated before, the attempt of this study is to further the understanding of the political economy of tax systems by exploring whether tax competition and economic development impact government choices of the tax revenue portfolio and whether these choices remain consistent with the assumption of politicians' vote-maximization. The

main problem in analyzing government is providing a model of government behavior capable of accounting for the observation that state government acts in the interest of its citizens but is also a rational and self-interested body. The review of existing theories presented in this chapter showed extensive work devoted to modeling government behavior and developing models of tax structure as well as the explanation of tax revenue design. The underlying theme of the existing models was that the industrial mix and tax competition within a political economy framework could explain tax revenue mix. This approach was found to be sensible given the focus of this research and its intent to bring three theories together. Understanding and recognizing the factors that shape state tax revenue mixes might be of significant importance to both policy-makers and economists. This literature review provides the basis for the conceptual framework that follows. The next chapter presents a theoretical framework that describes an altruistic, yet self-interested and rational government.

Chapter 4

Conceptual Framework

4.1 Introduction to Hettich and Winer's Model

The goal of this chapter is to augment Hettich and Winer's 1988 (H&W) approach to government behavior by allowing for the interaction among state governments and the interdependence of taxes within the state. Further, the equilibrium tax shares are derived from this new, augmented H&W model and they are presented in this chapter as well. These tax shares serve as a theoretical framework to the empirical model of tax revenue portfolio that is presented in Chapter 5.

In the H&W model, the decision-makers are elected officials whose ultimate goal is assumed to be reelection. As such, government officials have to decide how to use the state's limited resources to efficiently raise a sufficient amount of revenue while, at the same time, maximizing voters' support and providing public goods and services. Thus, according to the H&W framework, the k-th voter's support for government official is given by the following support function:

$$S_k = \{b_k(G) - c_k(l_k)\} \qquad k = 1,2,...,N \tag{1}$$

The arguments of the support function (1) are the benefits, b_k, and costs, c_k, of the public sector. Benefits have a positive impact on the support function, while the costs of providing these benefits have a negative effect on voters' willingness to support a government official. The level of public goods and services, G, positively influences the

benefits that voters receive, $\partial b_k / \partial G > 0$. On the other hand, the loss in full income, l_k, determines the cost of taxation[6], c_k, and has a positive influence on policymaker's costs of collecting tax revenue, $\partial c_k / \partial l_k > 0$.

4.2 Augmented Hettich & Winer's Model

Considering multiple state governments and allowing for interstate tax competition extends the H&W framework. This research assumes that there are two government officials who reside in two neighboring states *i*, where i=1,2. Following the H&W approach, each government official's tax revenue portfolio is modeled as if the policymaker maximizes voters' support. Given the importance of own-revenue sources, the focus of analysis is on three tax sources – the general sales tax (GST), personal income tax (PIT) and corporate income tax (CIT). The tax rates (j = GST, PIT, CIT) in state 1 are given by a tax vector $\mathbf{t^1}$= (t^1_{GST}, t^1_{PIT}, t^1_{CIT}). Each state is assumed to be composed of three representative voters – one for each tax source in question. Three representative voters are assumed to reflect different preferences of different taxpayers: retailers, income earners and businesses. These representative voters differ in terms of their tax payment duties and the benefits they receive from the public sector. The representative voters are assumed to adjust their voting patterns as well as their economic activities with respect to the changes in the state's own tax rates. Each representative voter is also assumed to have a reservation price, t^1_j, for consumption of a particular

[6] The loss in full income is given by the following relation: $\mathbf{l_k} = (\mathbf{TR_k} + \mathbf{d_k})$ where $\mathbf{TR_k}$ is the amount of tax revenue collected from source *k* and is defined by the following relation: $\mathbf{TR_k} = (\mathbf{t_k} * \mathbf{B_k})$. The term $\mathbf{B_k}$ represents the level of taxable economic activity; $\mathbf{t_k}$ is the tax rate and $\mathbf{d_k}$ represents the welfare loss due to taxation.

economic activity, B^1_j. The respective reservation price is less than or equal to the tax rate associated with each activity, t^1_j. In addition, the assumption is made that a change in t^1_j has a direct effect on the level of economic activity consumed by its respective voter, B^1_j. Due to a decrease in taxpayers' purchasing power and changes in taxpayers' behavior, it is expected that the level of economic activity, B^1_j, decreases as a state raises its respective tax rate, t^1_j. That is, $\partial B^1_j / \partial t^1_j < 0$ (Hewlett & Stephenson, 1983) is assumed. If government official 1 increases tax rate *j*, this will force the representative taxpayer *j* to "voice" her reaction with respect to the loss in income via voting (Hirschman, 1970). The inconvenience induced by high t^1_j at home might result in the loss of votes in the next election from this representative taxpayer. Government officials know that an increase in t^1_j can influence political costs associated with taxation and that voters may opt to change their votes in next election and consequently express their preferences for taxation. Therefore, an increase in t^1_j might have negative political consequences for the government official and, politically, it is highly undesirable.

Additional assumptions are made to the H&W framework. In particular, the interdependence of taxes within the states is assumed to exist. For instance, tax rate *h* (t^1_h) where *h* is some other activity different than *j* and within state 1, will affect the level of economic activity *j*, B^1_j. Here, it is assumed that representative taxpayers alter their behavior in such a way that B^1_h decreases due to an increase in t^1_h, $\partial B^1_h / \partial t^1_h < 0$, and at the same time changes the level of B^1_j, $\partial B^1_j / \partial t^1_h \gtreqless 0$.

Besides the reelection pressures, elected officials are assumed to face additional competitive pressures – the "yardstick" competition with the neighboring states. In classical yardstick competition, the jurisdictions compete for the residents and/or businesses. However, the approach used by this study is somewhat different from the traditional one. Here, it is assumed that migration and business location decisions are made on exogenous factors other than taxation. Given the small interregional elasticities with respect to taxes found by Bartik (1994) and Wasylenko (1997) as well as tractability reasons, this assumption is made so it can be possible to focus on factors that influence state tax shares. Thus, state officials are assumed to compete for tax revenue collected from non-residents. At the same time, government officials try to discourage home residents from tax shopping in the neighboring states, and therefore keep the tax revenue in the home state. Therefore, the home state tax portfolio is sensitive to tax competition with the neighboring states.

Furthermore, the yardstick competition between the states is based on the *tax rates* available in each of the states.[7] It is assumed that tax rates chosen by one government influence the choices made by another government (Hewett & Stephenson, 1983; Case, Hines & Rosen, 1993). The choice of tax rates as tax competing tools is made for several reasons. The tax rates are very visible to voters and therefore any changes to these visible instruments can result in political opposition. In addition, the voters can very quickly adjust their economic behavior to take advantage of differences in the tax rates between the states. Furthermore, policymakers' chances for reelection are

[7] For a comprehensive discussion of fiscal instruments available to government, see Wellisch 2000.

particularly sensitive to tax rate adjustments given the difficulty of adjustment as well as the political costs it induces. Nevertheless, given the effects that changes in tax rates have on a state's tax revenue collection, they are frequently proposed solutions to revenue problems.

With regard to tax competition, two different kinds of tax competition between the neighboring states are assumed. The argument is that policymakers recognize the different institutional arrangements for consumption and income taxes and, thus, compete differently about these taxes. More precisely, tax competition based on the general sales tax is assumed to be competition for cross-border shoppers and for tax revenue collected from non-residents. On the other hand, given the previous assumption on immobility of residents and businesses as well as the institutional structure of tax system in the United States, tax competition based on the personal and corporate income taxes is assumed to have "leader-follower" characteristics. Thus, the two kinds of tax competition discussed in the following section are (i) Competition about lower price for the general sales tax; (ii) "Leader-follower" competition for the two income taxes.

i) Competition Based on the General Sales Tax

With respect to the general sales tax, it is assumed that the home state (state 1) competes with its neighbors in such a way as to attract cross border shopping by neighbors' residents and to discourage home residents from shopping in neighboring states. An example will illustrate tax competition. Assume the general sales tax rate in state 1 is lower (or equal) than the tax rate in the neighboring state 2. Home state residents will not engage in cross-border shopping in this case. On the other hand, the necessary condition for the residents of state 2 to engage in cross border shopping is for

the tax differential to be greater than travel costs and it is given by the relationship: $(\mathbf{t}^2 - \mathbf{t}^1) > \mathbf{v}^2$. The residents of state 2 will take advantage of an available tax system in state 1 as long as the savings in taxes exceed the costs associated with "cross border shopping".[8] Consequently, tax competition and rational behavior of voters from state 2 can result in a substitution effect that increases state 1's taxable base as taxpayers of state 2 shift some of their economic activity to state 1, $\partial B_j^1 / \partial t_j^2 > 0$, to take advantage of the tax differential.

Following, Mintz and Tulkens, the home state can respond to increases in the general sales tax rate in state 2 by either raising, lowering or keeping its tax rate the same[9]. The movement in home state tax rates will depend on whether the home state values expansion of private or public sector spending. For example, lowering tax rates in state 1 may be beneficial for this state if the benefit loss induced by the lower public goods and services is compensated by the gains obtained from the expansion in its tax base and the reduction of the excess burden on its taxpayers associated with its taxes (Mintz & Tulkens, 1986).

ii) Competition Based on the Personal and Corporate Income Taxes

Tax competition based on the personal income and corporate income taxes is viewed as a "leader-follower" competition. Given the institutional structure of the tax system that

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[8] The same conditions and analysis hold for the residents of state 1 – for residents of state 1 to engage in tax shopping it has to be true that the tax differential is greater than the costs of transportation/reallocation: $(\mathbf{t}^1 - \mathbf{t}^2) > \mathbf{v}^1$.

[9] Mintz and Tulkens demonstrated that an increase in a neighbor's tax rate can produce a positive, negative or flat reaction function. Given these different scenarios, government officials in state 1 can encourage (discourage) the residents in state 2 (as well as their own residents) to tax shop in state 1 depending on how t^1_j is changed in response tot he increase in t^2_j. This will result in changes in the level of tax revenue collected.

requires residents to pay taxes at the place of work and allows them to receive tax credit at the place of residence, the income tax competition is viewed as a *political competition* rather than the competition for tax revenue[10]. Furthermore, given the previous assumption of the immobility of the residents and businesses, there is no reason for states to compete for either residents or businesses and that is an additional motive for a "leader-follower" relationship.

In order to maximize their political support, home state policymakers use neighbors with the highest income taxes as a benchmark to remind their residents and businesses of the price of public goods and services in the neighboring area. On the other hand, the residents and businesses of the home state have an option of "voting at the poll" with the personal income tax and "voting with dollars" with the corporate income tax, and thus expressing their preferences for the income taxes. However, policymakers realize that residents and businesses will not respond to tax differential by leaving the home state. "Voting at the poll" and "Voting with dollars" are assumed to be the ways of "disciplining" home state policymakers.

An additional assumption regarding tax competition is that each state government official behaves in a "Nash manner." That is, he chooses the best response with respect to his beliefs of how neighboring state officials will play. By changing the tax rates, tax bases and deductions of different activities, and thereby shifting the burden of taxation to other activities, the policymakers are able to manipulate their tax revenue portfolio, in an

[10] The corporate income tax paid by the apportionment formula that serves as a proxy for the place of work of the corporations.

attempt to maximize voters' support. Therefore, the level of taxable economic activity in state 1 is given by:

$$B_j^1 = B_j^1(t_j^1, t_j^2, x^1, v^1) \qquad where \quad \begin{array}{ll} \partial B_j^1 / \partial t_j^1 < 0 & where \quad j = GST, PIT, CIT \\ \partial B_j^1 / \partial t_h^1 \gtrless 0 & h \neq j \\ \partial B_j^1 / \partial t_j^2 > 0 & if\,(t_j^{\,2} - t_j^{\,1}) > v^2 \\ & only \quad when \quad j = GST \end{array} \tag{2}$$

A similar analogy applies to the deadweight losses of *j*-taxes in state 1.[11] The vector $\mathbf{x}^1$ represents the set of exogenous factors that determine demographic and economic characteristics of state 1. The costs of tax shopping for residents of state 1 are given by vector $\mathbf{v}^1$. After accounting for the above assumptions, the new support function of the representative voters that reside and vote for the government in state 1, $\mathbf{S}^1$, is given by the difference between the benefits and the costs produced by the public sector:

$$S^1 = \{b^1(G) - \sum_{j=GST,PIT,CIT,OT} (c_j^1(l_j^1))\} \tag{3}$$

where OT are tax revenue sources other than general sales, personal income and corporate income taxes.

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[11] The deadweight losses are given by the deadweight loss vector: $d_j^1 = d_j^1\,(t_j^1,\ t_j^2,\ x^1,\ v^1)$. Following H&W it is assumed that $\partial d_j^1 / \partial t_j^1 > 0$. In addition, $\partial d_j^1 / \partial t_h^1 \lessgtr 0$; and $\partial d_j^1 / \partial t_j^2 \lessgtr 0$, reflect the effect that the interdependence between the taxes within the state and interstate tax competition have on the excess burden.

The government official in state 1 has two sets of fiscal instruments at his disposal. He can choose the level of public expenditures, G^1, and tax rates. Given the current study's interest in analyzing three tax sources – the general sales, personal income and corporate income taxes -- three respective tax rates are assigned to government officials as their tax revenue and tax competing tools, $\mathbf{t}^1 = (t^1_{GST}, t^1_{PIT}, t^1_{CIT})$. Thus, the policymaker will make the tax choices so as to maximize the voters' support function:

$$\max_{G^1, t^1_{GST}, t^1_{PIT}, t^1_{CIT}} S^1 = \{b^1(G^1) - \sum_{j=GST,PIT,CIT,OT} (c^1_j(l^1_j))\} \tag{4}$$

Subject to a budget constraint:

$$G^1 - \sum_{j=GST,PIT,CIT,OT} (t^1_j \cdot B^1_j) = 0 \tag{5}$$

and subject to the representative voters' responses to taxation reflected through the levels of taxable activities j, $\mathbf{B}^1 = (B^1_{GST}, B^1_{PIT}, B^1_{CIT})$. The (3+2) first-order conditions for government 1's problem are given by:

$$G^1 - \sum_{j=GST,PIT,CIT,OT} t^1_j \cdot B^1_j = 0 \tag{6}$$

$$\partial b^1 / \partial G^1 - \lambda = 0 \tag{7}$$

$$-\left[\frac{\partial c^1_{GST}}{\partial l^1_{GST}}\frac{\partial l^1_{GST}}{\partial t^1_{GST}}+\sum_{h=PIT,CIT,OT}\frac{\partial c^1_h}{\partial l^1_h}\frac{\partial l^1_h}{\partial t^1_{GST}}\right]=\lambda\left[\left(B^1_{GST}+t^1_{GST}\frac{\partial B^1_{GST}}{\partial t^1_{GST}}\right)+\left(\sum_{h=PIT,CIT,OT}t^1_h\frac{\partial B^1_h}{\partial t^1_{GST}}\right)\right] \tag{8.1}$$

$$-\left[\frac{\partial c^1_{PIT}}{\partial l^1_{PIT}}\frac{\partial l^1_{PIT}}{\partial t^1_{PIT}}+\sum_{h=GST,CIT,OT}\frac{\partial c^1_h}{\partial l^1_h}\frac{\partial l^1_h}{\partial t^1_{PIT}}\right]=\lambda\left[\left(B^1_{PIT}+t^1_{PIT}\frac{\partial B^1_{PIT}}{\partial t^1_{PIT}}\right)+\left(\sum_{h=GST,CIT,OT}t^1_h\frac{\partial B^1_h}{\partial t^1_{PIT}}\right)\right] \tag{8.2}$$

$$-\left[\frac{\partial c^1_{CIT}}{\partial l^1_{CIT}}\frac{\partial l^1_{CIT}}{\partial t^1_{CIT}}+\sum_{h=PIT,GST,OT}\frac{\partial c^1_h}{\partial l^1_h}\frac{\partial l^1_h}{\partial t^1_{CIT}}\right]=\lambda\left[\left(B^1_{CIT}+t^1_{CIT}\frac{\partial B^1_{CIT}}{\partial t^1_{CIT}}\right)+\left(\sum_{h=PIT,GST,OT}t^1_h\frac{\partial B^1_h}{\partial t^1_{CIT}}\right)\right] \tag{8.3}$$

The outcome of this optimization problem can be characterized as a non-cooperative one where each state government behaves in the "Nash manner" choosing its own tax rate and thus level of public services to maximize voters' support while taking as a given the tax rate set by their neighbor. The resulting tax rates and the general sales, personal income and corporate income tax shares that maximize the government's support function in state 1 are given by:

$$(t^1_j)^*=\left[\frac{\left(\frac{\partial c^1_j}{\partial l^1_j}\frac{\partial l^1_j}{\partial t^1_j}+\sum_{h\neq j}\frac{\partial c^1_h}{\partial l^1_h}\frac{\partial l^1_h}{\partial t^1_j}\right)+\lambda\left(B^1_j+\sum_{h\neq j}t^1_h\frac{\partial B^1_h}{\partial t^1_j}\right)}{-\lambda\left(\frac{\partial B^1_j}{\partial t^1_j}\right)}\right]$$

$$where \quad j=GST,PIT,CIT \tag{9.1)-(9.3}$$

$$TS^1_{GST} = \left[\frac{\frac{1}{\lambda}\left(\frac{\partial c^1_{GST}}{\partial l^1_{GST}} \frac{\partial l^1_{GST}}{\partial t^1_{GST}} + \sum_{h=PIT,CIT,OT} \frac{\partial c^1_h}{\partial l^1_h} \frac{\partial l^1_h}{\partial t^1_{GST}} \right) + \left(B^1_{GST} + \sum_{h=PIT,CIT,OT} t^1_h \frac{\partial B^1_h}{\partial t^1_{GST}} \right)}{-\varepsilon_{GST} \cdot \left[\sum_{j=GST,PIT,CIT,OT} B^1_j \cdot t^1_j \right]} \right] t^1_{GST} \tag{10}$$

$$TS^1_{PIT} = \left[\frac{\frac{1}{\lambda}\left(\frac{\partial c^1_{PIT}}{\partial l^1_{PIT}} \frac{\partial l^1_{PIT}}{\partial t^1_{PIT}} + \sum_{h=GST,CIT,OT} \frac{\partial c^1_h}{\partial l^1_h} \frac{\partial l^1_h}{\partial t^1_{PIT}} \right) + \left(B^1_{CIT} + \sum_{h=GST,CIT,OT} t^1_h \frac{\partial B^1_h}{\partial t^1_{PIT}} \right)}{-\varepsilon_{PIT} \cdot \left[\sum_{j=GST,PIT,CIT,OT} B^1_j \cdot t^1_j \right]} \right] t^1_{PIT} \tag{11}$$

$$TS^1_{CIT} = \left[\frac{\frac{1}{\lambda}\left(\frac{\partial c^1_{CIT}}{\partial l^1_{CIT}} \frac{\partial l^1_{CIT}}{\partial t^1_{CIT}} + \sum_{h=GST,PIT,OT} \frac{\partial c^1_h}{\partial l^1_h} \frac{\partial l^1_h}{\partial t^1_{CIT}} \right) + \left(B^1_{CIT} + \sum_{h=GST,PIT,OT} t^1_h \frac{\partial B^1_h}{\partial t^1_{CIT}} \right)}{-\varepsilon_{CIT} \cdot \left[\sum_{j=GST,PIT,CIT,OT} B^1_j \cdot t^1_j \right]} \right] t^1_{CIT} \tag{12}$$

Where ε_j represents the elasticity of j taxable activity with respect to its tax rate.

The main purpose of this model is to identify political, economic and tax competition factors that influence state tax revenue portfolio. Due to the current study's interest in explaining the movements in tax portfolio over time and across states, the equilibrium tax shares derived in equations (10) to (12) are further examined and their relevant determinants are defined in the following section.

The first term of equations (10) to (12)'s numerators represents the total costs of taxation. The total costs of taxation include voters' *losses in full income* due to taxation

and hence the *political costs* of taxing one activity relative to another. The focus of the current study is on the political costs that arise from choosing one tax portfolio versus another. The tax portfolio model presented in this chapter (equation 10 to 12) allows for different political costs and different payoffs for government officials. In other words, some of the tax portfolio choices made by policymakers might have high political costs and low political benefits and vice versa.

The terms in the second bracket of numerators of the portfolio model given by the equations (10) to (12) reflect the structure of private economy in state 1, as well as the interdependence of different tax sources, $\sum_{h \neq j} t_h^1 \frac{\partial B_h^1}{\partial t_j^1}$. As stated earlier, government is assumed to adjust state tax revenue portfolio in accordance to state economic development. As the economic characteristics of a state change, so do the *tax handles* to which the revenue system can be attached. Higher concentration of certain economic activities within the state allows for use of certain tax handles. Therefore, the presented model allows for state tax revenue mix to look differently depending on state production mix.

Finally, the effects of interstate tax competition are expressed in the state's choice of tax revenue portfolio and its respective tax rates. The denominators and the final terms of equations (10) to (12), t_j, reflect the effects that interstate tax competition has on state's choice of tax portfolio. Three tax rates are tax competing tools assigned to government officials. Each state government decides on its tax rates in a "Nash manner". The choices of level of tax rates have a direct effect on state tax revenue portfolio.

For purpose of policy analysis, this research is concerned with the effects that state tax rates, structure of state private economy as well as political environment have on state tax portfolio. The main argument is that as the factors that determine the supply of taxable activity change (the factors such as tax rates, characteristics of private economy and political factors), and as the cost of tax shopping changes, the political equilibrium and resulting tax revenue portfolio change as well. The model developed in this chapter allows several hypotheses to be tested. These testable hypotheses are the following:

Hypothesis Number 1:
As more tax revenue is collected from the potential tax base, political costs increase

A standard argument regarding political costs is that political costs grow as more revenue is raised from the potential tax base (Hettich & Winer, 1984). The state *i*'s reliance on tax source *j*, TS^i_j, is influenced by the availability of that particular tax source, B^i_j, as well as the other tax sources, B^i_h in the state. Due to the political opposition of those taxpayers on whom particular tax, *j*, will fall the policymakers will tend to rely less heavily on B^i_j. Therefore, state *i*'s tax reliance on source *j*, TS^i_j, will be lower. This approach is consistent with the view that manipulating the tax revenue portfolio minimizes political opposition to taxation by reducing the political costs.

Hypothesis Number 2:
As the state economic structure changes so does the state tax revenue portfolio

The relative importance of a specific tax in total tax revenue depends on the level and kind of taxable economic activities available to government officials (McLure, 1981; Merriman & Skidmore, 1998). Shifts in the mix of state production across industries have an impact on state reliance on a particular tax. The structural changes of the private

sector give a wide range of taxable activities. Over time, these structural changes alter the magnitude of state reliance on a particular tax source and therefore state tax portfolio. The presence of different industries is expected to have a different effect on state tax revenue mix, $\partial TS_j^1 \Big/ \partial B_j^1 \gtrless 0$. The changes in the industrial mix create new taxable activities and enable the policymakers to "go after" these new tax sources and, therefore increase/decrease their reliance on certain taxes.

The following two hypotheses are regarding the interstate tax competition. As stated before, government officials are assumed to choose tax shares and tax rates in order to maximize their voters' support, while taking as given the tax shares and tax rates set by their neighbors. However, the forms of tax competition can differ across tax sources.

Hypothesis Number 3:
There is a negative relationship between the neighbors' general sales tax rate and the home state's general sales tax

Given the ease of mobility between states, the presence of cross-border shopping as well as growth of electronic commerce, the tax competition with the neighboring states is based on general sales tax rate. The government officials choose general sales tax shares and tax rates with the recognition that home residents may shop in the neighboring states or make their purchases online. In addition, government officials attempt to set general sales taxes low enough so they can attract non-residents to cross-border shop. If a competing neighboring state raises its tax rates, the cost increase across the border will make the home state activities more attractive, which should lead to cross- border

shopping (Fox, 1986). In that case, state 1 will try to undercut the neighbor with the lowest general sales tax in order to attract its residents, $\frac{\partial TS^1_{GST}}{\partial t^1_{GST}} \frac{\partial t^1_{GST}}{\partial t^2_{GST}} < 0$.[12]

Hypothesis Number 4:
There is a positive relationship between the income taxes of neighboring states and home state income taxes.

The yardstick competition that is based on personal income and corporate income taxes is established on a "leader-follower" relationship. The states follow the neighbor with the higher personal income tax as well as the neighbor with the higher corporate income tax. Mintz and Tulkens (1986) were able to show that change in a neighbor's tax rate can produce a variety of responses in the home country. *The authors suggest that the overall effect of changes in tax rates in neighboring states will positively influence the level of taxable activity and therefore tax revenue in the home state.* Similarly, Case (1993) found that a state is more likely to raise its tax rates when neighbors are doing the same. That is, as neighbors increase their reliance on a particular income tax source, one can expect the home state to do the same,

$$\frac{\partial TS^1_{PIT}}{\partial t^1_{PIT}} \frac{\partial t^1_{PIT}}{\partial t^2_{PIT}} > 0 \quad and \quad \frac{\partial TS^1_{CIT}}{\partial t^1_{CIT}} \frac{\partial t^1_{CIT}}{\partial t^2_{CIT}} > 0.$$

Hypothesis Number 5:
There is interdependence among home tax rates

Changes in home tax rates other than t^i_j within state *i*, can have effects on t^i_j. For instance, if officials observe that more high-income people reside in state *i*, they might manipulate their tax revenue portfolio and propose an increase in personal income tax

[12] The only case when this is not going to hold is if neighboring state's general sales tax rate is so low that it is not worth reducing the home state general sales tax rate (Kanbur & Keen, 1993).

rates while lowering the general sales and/or corporate income tax rate. This proposal might be attractive to residents if a majority of them can benefit from lower general sales tax and/or lower corporate income tax. In other words, if the trade-off between the two taxes is beneficial for the majority of voters, the proposed changes in tax structure and therefore tax revenue portfolio might not be as politically costly to the government official, $\partial t_j^1 \Big/ \partial t_h^1 \gtrless 0$.

4.3 Summary of the Conceptual Framework

The current chapter provides the conceptual framework for the empirical analysis that follows. More precisely, in this chapter the Hettich and Winer's conceptual framework is presented. Furthermore, Hettich and Winer's model is augmented in order to account for the interdependence of taxes within the state as well as for interstate tax competition. The equilibrium tax shares that are derived from this augmented Hettich and Winer model identify political, economic and tax competition factors that influence state tax revenue portfolio. In the absence of exogenous binding forces, the resulting equilibrium tax shares, and therefore tax revenue portfolio, are assumed to be stable social convention and self-enforcing, and can be viewed as a rest point of some adjustment process. Several hypotheses are derived from the augmented Hettich and Winer's model and presented in the current chapter. These hypotheses are tested in the following Chapter 5.

Chapter 5

Empirical Specification of State Government Behavior And Data Sources

5.1 Introduction to Empirical Section

The goal of this chapter is to specify an empirical model that is based on the underlying theoretical model presented in Chapter 4. The empirical model is viewed as an estimation of the theoretical one, advanced as a simultaneous approximation to the objectives outlined earlier. The focus is on estimating effects of political costs, the economic characteristics and the tax competition constraints that state officials face while raising tax revenue and deciding on the preferred tax revenue portfolio. Therefore, the current chapter identifies the empirical determinants of government behavior. Consequently, the chapter

a) outlines the empirical model and presents the equations to be estimated within the theoretical framework;

b) identifies dependent and independent variables and

c) presents the data to be used for estimating the tax portfolio model.

5.2 Estimating Equations

In the theoretical analysis presented in Chapter 4, changes in state tax shares result directly from government officials' response to changes in political, economic and tax competition constraints. The benefits voters receive from consuming public goods and services and the costs of these services are determined simultaneously so as to maximize government officials' net political benefits. In the following empirical

framework, the argument is made that the assumed objective of government officials, the voters' support function $S^i = S^i (b^i, c^i)$, is weakly separable between b^i and c^i.[13] Furthermore, it is assumed that the government official is well aware of the political costs of collecting the revenue from a particular source and then providing the benefits. Hence, an increase in voters' public service benefits is preferred by policymakers at a decreasing rate. An additional argument for the empirical framework is that maximization of the voters' support function, S^i, due to the voters' indirect influence on b^i and c^i, directly translates to the state's choice of tax revenue mix and officials' choice of tax competition tools, that is tax rates. Consequently, in the current empirical model, the state's tax revenue portfolio and the state's choice of tax rates are determined simultaneously.

The following empirical model is a system for estimating structural equations for each of the tax shares available in state *i* and for each of tax rates associated with these tax shares. Given that a state's revenue is composed of taxes from many sources, the tax shares and tax rates to be examined include the general sales tax (GST), personal income tax (PIT) and corporate income tax (CIT). Specifically, the empirical model is given by:

[13] A disconnection between the tax revenue and expenditure has been widely discussed in the public finance literature. Musgrave and Musgrave (1989) state that: "Although good economic analysis calls for joint consideration of both aspects, the practice is to deal with them separately". Similarly, the current study recognizes the role of spending in tax revenue composition and therefore, it treats the spending as an important determinant of the tax revenue composition.

$$TaxShare_j = \mu_j + PoliticalCosts\beta_j^{pc} + EconomicCharacteristics\beta_j^{ec} + TaxCompetition\beta_j^{tc} + \varepsilon_j$$

$$+$$

$$where \quad j = GST, PIT, CIT$$

(13)-(15)

$$TaxRate_j = \mu_j + HomeTRates\beta_j^{htr} + TaxShare\beta_j^{ts} + BorderMarket\beta_j^{bm} + PoliticalParty\beta_j^{pp} + Neighbor\beta_j^{ntr} + Income\beta_h^{inc} + \varepsilon_j$$

$$where \quad j = GST, PIT, CIT$$

$$where \quad h = GST, PIT$$

(16)-(18)

A 1050 x 1 vector μ_j contains the constant terms and term ε_j represents the vector of error terms.

5.3 Tax Share Equations (13) to (15)

Equations (13) to (15) are used to examine the effects of political factors, state economic characteristics and tax competition on general sales, personal income and corporate income tax shares available to state governments. Dependent and independent variables for these equations are presented and defined in Table 2 and Table 3. The

relevant variables for the tax share equations (13) to (15) are grouped into four main categories. These four categories are *Tax Share, Political Costs, Economic Characteristics and Tax Competition.*

5.3.1 The *Tax Share* Matrix

The first set of variables is given by the *Tax Share* matrix. This matrix contains the information on the three tax shares across the fifty states and over the twenty-one year period. The tax shares are dependent variables. These variables are measured as a percentage of state *total tax revenue*. General sales, personal income and corporate income tax shares are defined following the U.S. Bureau of the Census definitions discussed in Chapter 2.

5.3.2 The *Political Costs* Matrix

The first group of tax share determinants is given by the *Political Costs* matrix. The policymakers receive *instructions* from the voters about the voters' tax preferences. These instructions are received through voters' financial contributions to policymaker's campaign, as well as via voters' votes during the election process. The political costs of making certain tax choices can be seen as the expected net loss in financial contributions or in votes that will result in the next election. Given the difficulty of measuring the political costs directly, the factors that influence political costs associated with taxation and prediction of the government's action are identified for this category. The argument is that the factors such as political opposition of those on whom a particular tax will fall are the forces that influence the political costs of the tax revenue mix (Hettich & Winer,

1984). Rational government officials keep an eye on various groups of taxpayers to see what decisions should be made to assure taxpayers' political support. Therefore, the variables included in the *Political Costs* category are calculated as the ratios of *potential tax bases*. These ratios are lagged by one period to better reflect the effect they have on a state's choice of tax revenue portfolio. The variables that serve as proxies for political cost that policymakers face are defined in Table 2.

Each tax source (GST, PIT and CIT) is assigned two political cost variables. These political cost variables should reflect the size of one taxable activity relative to the alternative ones. The first political cost variable for the general sales tax share equation is the ratio of retail and service receipts to state personal income (Political Cost GST/PIT). The second political cost variable for the general sales tax share equation is the ratio of retail and service receipts to corporate income earned in state *i* (Political Cost GST/CIT). Similarly, the political cost variables for the personal income tax share equation are the ratio of state personal income to retail and service sales (Political Cost PIT/GST) and the ratio of state personal income to corporate income (Political Cost PIT/CIT). Finally, the political cost variables for the corporate income tax share equation are the ratio of corporate income to the value of retail and service sales (Political Cost CIT/GST) and the ratio of corporate income to state personal income (Political Cost CIT/PIT). Again, these ratios should reflect the relative size of alternative taxable activities on which a particular tax will fall and therefore the rise of political opposition of the voters, who will pay these taxes.[14] The signs on these variables should be negative

[14] The alternative ways of measuring the political costs, as well as their strengths and weaknesses are presented in Appendix 3.

and should express an increase in political opposition from those taxpayers on whom the particular tax will fall. In other words, the negative sign of the political cost variables should express high political costs associated with given tax portfolio. Therefore, in the case when political opposition to a tax increase rises, one can expect state reliance on that tax source to decrease.

5.3.3 The *Economic Characteristics* Matrix

One of the characteristics of state tax system that might concern the policymakers is the responsiveness of their tax portfolio to the level and kind of economic activity located within their jurisdictions. Musgrave (1979) argued that the ease of collecting tax revenue may be positively related to (a) the sectoral composition of the economy, (b) the percentage of workers employed in economic units that exceed a certain size limit and (c) the importance of large retail establishments. This suggests that the state's tax revenue might be more responsive to changes in the level of a particular economic activity if the state relies more heavily on one tax than it would if the state relied heavily on another tax, *ceteris paribus*. Similarly, McLure (1967, 1981) argued that one of the major determinants of the effect of state economic characteristics upon taxation is the dominance of the taxed industries in their respective markets as well as in the respective states.[15] The greater the degree of dominance, McLure argued, the greater the taxation of

[15] McLure examined the export rates for different states and various taxes (general retail sales, selective sales taxes, corporate income taxes, franchise and miscellaneous taxes) for 1962. The author's findings suggest a strong likelihood that a state will use the taxes that are most easily exported and thus adjust its tax revenue mix accordingly. An industry that leads within a state and has a national market, McLure argued, is a necessary condition for a state to take the advantage of its dominance.

that sector and the potential for tax exporting.

The second group of tax share determinants, *Economic Characteristics*, is composed of variables that reflect the state's production mix as well as state market characteristics. For all three tax share equations the *Economic Characteristics* is the 1050 x 11 matrix. The first seven variables of *Economic Characteristics* matrix characterize the industrial composition in the fifty states during the 1979-1999 period. The additional four variables define the state's market characteristics. Earlier, the argument was made that as the state's industrial make-up changes so does the state government's ability to raise tax revenue and provide public goods and services.

The current study follows McLure's methodology and identifies seven one-digit industries. The sample of these industrial classifications contains farming, mining, construction, manufacturing, trade, transportation and finance. These seven industries are classified as the ones that serve national markets. Furthermore, the percentages of the activity level of the firms in those industries are calculated. The number of employees in a particular sector serves as a proxy for that sector's activity level in the state. The ratio of the level of economic activity in a particular industry to the total non-government level of economic activity in a state is intended to measure the sensitivity of tax revenue portfolio to changes in sectoral composition of the economy (White, 1986).

Other characteristics of state markets are also included in this analysis. These variables are state per capita income, population and the percentage of state's population that is prime working age. They are considered as the additional exogenous determinants of the private economy. The choice of these variables is widely supported by the economic literature. For example, Groves and Khan (1952), Legler and Shapiro (1968),

Murphy and Izraeli (1997) and Merrifield (2000) employed personal income per capita and population growth variables in their estimations of tax revenues.[16] Bhat (1997) employed additional economic growth indicators -- per capita public expenditures lagged one year -- to estimate tax revenue in India. The current study follows the existing literature closely and employs variables that reflect state personal income per capita (IncomePC), state population, (Population) and lagged public expenditure (ExpenditurePC) to capture different *kinds* of economic growth.

Finally, in order to control for taste differences among taxpayers, an additional demographic variable that reflects the population characteristics within a state is employed. The percentage of the state population that is prime working age (PrimeAge) should help determine voters' preferences for different tax revenue portfolio. For instance, if the majority of a state's voters are older individuals, they might prefer a personal income tax to the alternatives as that would shift the tax burden to younger residents that are at the peak of their earning years. Metcalf (1993) found that residents that belong to the age group between eighteen and forty-four prefer fewer taxes collected from personal income and general sales. On the other hand, the elderly prefer selective sales tax, corporate income tax and personal income tax. By employing the variable that

[16] Groves and Khan (1952) investigated the income elasticity of various state and local taxes as well as the effects of changes in personal income on tax yields. Similarly, Legler and Shapiro (1968) examined the responsiveness of state tax revenue to economic growth in eight different states. To estimate tax revenue for different types of growth, Legler and Shapiro applied state per capita income and population growth variable*s*. The data used in Legler and Shapiro's regression analysis was for the years 1945-64 from eight states: California, Colorado, Connecticut, Illinois, Iowa, Maryland, Michigan and Ohio. Murphy and Izraeli (1997) found that as per capita income increases, the level of service demanded also increases. However, the residents' preference for particular taxes was not easily determined – it may increase or decrease. Similarly, Merrifield (2000) found that population growth has a significant positive influence on tax revenue.

reflects the prime working age population, this study attempts to test Metcalf's hypothesis that implies a relationship between the voters' age and state tax revenue portfolio.

5.3.4. The *Tax Competition* Matrix

In order to address the issue of interstate tax competition among geographic neighbors on a tax-by-tax basis, the third set of tax revenue determinants, the *Tax Competition* matrix, contains information on neighbors' tax shares, as well as on home state tax rates. A significant factor in determining state tax revenue mix is assumed to be interjurisdictional tax competition. The debate about modeling tax competition focuses on whether tax competition forces tax rates of neighboring states to move together (Hewett & Stephenson, 1983; Case, Hines & Rosen, 1993), or whether the tax competition is influenced by the presence of tax-havens (Chernick, 1997). Similarly, there is no agreement in the literature on who are a state's competitors – neighboring states or non-neighboring states that are similar in some respects.[17] Given that the neighbors share similarities that permit voters to compare among them when choosing to vote for a policymaker, the present study follows the Case, Hines and Rosen (1993) tax competition approach and assumes that state geographic neighbors are the most influential tax competitors. There are two reasons for this decision: (i) the neighboring states share some similarities that can be used by the voters to assess the appropriateness of changes in tax rates and thus tax revenue portfolios; (ii) voters often use information about *neighboring states* to "discipline" and judge their policymakers (Basley and Case,

[17] For detailed discussion on the choice of a state's competitors, see Appendix 3.

1995). However, it should be noted that even thought cross-border shopping is by far the most important element of tax competition and is frequently used by voters to avoid high taxes, it is not the only way of avoiding the taxes. Electronic commerce and catalog sales are another increasingly popular methods of residents' shopping that significantly affects state tax revenues (Bruce & Fox, 2000). The presence of these alternative methods intensifies tax competition among the states by giving the residents an option of relatively cost less cross-border shopping. Given different pricing strategies associated with the electronic commerce and the catalog sales shopping (costs of shipping and handling) as well as the inability of state governments to affect federal government legislation, these other shopping options are not going to be examined in empirical section. Due to the current study's focus on the political economy aspect of tax competition and the role that neighbors and cross-border shopping have in determining the home state choice of the tax revenue portfolio, more detailed treatment of other shopping options (other then cross-border shopping) is left for future research.

Furthermore, given the interest in examining the possibility that a representative voter from each group of taxpayers compares home state tax reliance with those in the neighboring states, the neighbors' tax shares are identified for general sales, personal income and corporate income tax share equations. In addition, due to the fact that this study deals with different kinds of taxes (consumption and income taxes), different kinds of tax competition between the neighbors are identified. The lowest general sales tax share in the neighboring area (Neigh. Min GST) is used as a determinant of home general sales tax share. Given the ease of cross-border shopping and the rise of electronic commerce, state policymakers set their consumption taxes relatively low comparing to

their neighbors in order to gain from the tax competition phenomenon. In addition to these *economic* components of tax competition, *political* factors also play an important role in determining a state's reliance on the general sales tax. Given that the residents compare their home state reliance on the general sales tax relative to the neighboring states, it is expected that the lowest reliance on the general sales tax in the neighboring area to be negatively correlated with the general sales tax share in the home state.

A different kind of interstate tax competition exists in the case of income taxes. In this study, the *political* neighbors play an important role in determining state reliance on the two income taxes. Accordingly, the highest personal income tax share in the neighboring area (Neigh. Max PIT) and the highest corporate income tax share (Neigh. Max CIT) in the neighboring area, identified as those states with contiguous borders, during the 1979-1999 period, are examined to test the interstate income tax competition. Given the institutional characteristics of the two income taxes, the states are assumed to follow a *political* neighbor with the highest personal income tax and the highest corporate income tax. The idea is that policymakers refer to the neighboring state with the highest income taxes when reminding their own voters of the benefits provided by the public sector. For instance, if a neighbor with the highest personal income tax share increases its reliance on this tax source, the home state policymakers are expected to advocate the same change in their home state. Usually, the reason for this advocacy is better provision of public goods and services. Therefore, an increase in a neighbor's reliance on personal and/or corporate income taxes encourages home government officials to follow this neighbor by increasing their reliance on the same tax source. The higher the "highest" tax share for a particular income tax in the neighborhood, the more the home state

officials can rely on this source of revenue without a danger of losing voters' support and tax revenue erosion. Therefore, it is expected for the highest personal income tax and the highest corporate income tax shares in the neighboring states to have a positive effect on home state personal income and corporate income tax shares and therefore to alter state tax revenue composition.

All three neighbors' tax shares (Neigh. Min GST, Neigh. Max PIT and Neigh. Max CIT shares) are lagged by one year to allow time for the government officials to respond to changes in their neighbors' tax policies. This way of analyzing tax competition between neighbors has been widely utilized by researchers. For instance, Hewett and Stephenson (1983) and Case (1993) used three- and two-year lags, respectively, in their studies. The idea is that, in practice, government officials are concerned with their tax policies relative to those of their neighboring states.

Besides the neighbors' tax shares, the *Tax Competition* matrix for all three tax share equations contains an additional tax competition variable. Given the assumptions that state governments behave in "Nash manner" and that they use their available tax rates as tools for tax competition, the home state tax rates are included in three tax share equations (13) to (15). The yardstick competition between neighbors influences state officials to behave in "Nash manner", that is, to observe their neighbors' tax decisions and, based on that observation, make changes to their own tax system. In this study, the home state statutory general sales tax rate (GST Rate) and home state statutory corporate income tax rate (CIT Rate) are identified for this category. The choice of *statutory* tax rates is justified on the basis that changes in a state's statutory tax rates are very visible

forms of tax legislation to voters (Wagner, 1971; Nelson, 2000). In addition, the statutory rate structure determines the efficiency of state tax system.

A different approach is used when determining the home state personal income tax rate. The personal income tax rate (PIT Rate) for the personal income tax share equation (equation 17) is calculated as a ratio of personal income tax revenue collected to state adjusted gross income. Such a calculated personal income tax rate gives the state's *effective* personal income tax rate. The reason for the difference in treatment between the general sales and corporate income tax rates and the personal income tax rate is that, in contrast to statutory GST Rate and CIT Rate, modifications of state personal income tax laws tend to be less visible and not well understood by the public. Therefore, modifications of state laws that apply to the personal income tax tend to arouse less voter dissatisfaction. The policymakers tend to utilize this characteristic of the personal income tax and thus minimize the political costs of collecting personal income tax revenue. A detailed discussion regarding the determinants of state tax rates is given in the following section.

5.4 Tax Rate Equations (16) to (18)

Competitive tools available to government officials include different kinds of taxes, tax rates, the size of the taxable base and government expenditures. Based on the theoretical model presented in Chapter 4, the argument of this research is that government officials compete around tax rates, as changes in tax rates are rapidly reflected in the level of taxable economic activity. Furthermore, given the differences among the general sales, personal income and corporate income taxes, the empirical

specification of politically desirable tax rates is viewed to be slightly different for the three tax rates in question. Consequently, the determinants of tax rates are grouped into six different categories for the general sales and personal income tax rate equations (equations 16 and 17), and five categories for the corporate income tax rate equation (equation 18).

5.4.1 The *Home Tax Rates* Matrix for Equations (16) to (18)

The three tax rates examined by the current study – the general sales tax rate (GST Rate), the personal income tax rate (PIT Rate) and the corporate income tax rate (CIT Rate) -- are assumed to be interdependent. Therefore, each tax rate equation is explained by the *Home Tax Rates* matrix. The variables that compose the *Home Tax Rates* matrix are the two tax rates other than the tax rate in question. The interdependence between different tax rates is assumed to exist and to influence the movements in tax rate levels, which in turn influences state tax portfolios.

5.4.2 The *Tax Share* Vector for Equations (16) to (18)

Penniman (1971) argues that state tax rates depend on the degree of a state's previous reliance on a particular tax source. The current study follows the same argument and defines state's previous reliance on the three tax sources. It contains the lagged general sales tax share (*GST Lag*) for the general sales tax rate equation (equation 16); lagged personal income tax share (*PIT Lag*) for the personal income tax rate equation (equation 17); and lagged corporate income tax share (*CIT Lag*) for the corporate income tax rate equation (equation 18). It is expected that the lagged tax shares

will have a positive effect on their respective tax rates, given that they serve as the determinant of a state's earlier dependency on a particular tax.

5.4.3 The *Border Market* Matrix for Equations (16) to (18)

The current study assumes that geographic neighbors influence state tax revenue portfolios. The argument is that states consider their border counties' population and income characteristics when determining home tax rates. An additional argument is that states consider their neighbors' border counties' population and income characteristics when deciding on home tax rates and thus the tax revenue mix. The *Border Market* matrix contains the population and income characteristics of a state's border market.

The first variable of the *Border Market* matrix is the home state population that lives in bordering counties (*Home Border Pop*), as a percentage of total state population. Second, the neighbors' population that lives in bordering counties of the reference state, *Neigh. Border Pop*, is calculated as a percentage of the neighbors' total population. The variable that defines home state income earned in bordering counties, as a percentage of total income earned within the state, *Home Border Income*, is the third variable of the *Border Market* matrix. Similarly, the neighbors' income earned in bordering counties, *Neigh. Border Income,* is calculated as a percentage of total income earned within the neighboring states.

Both population and income variables should help to measure the magnitude of the broader market served by the home state. The characteristics of the border market give policymakers complete information on the number of residents that can relatively easily "tax shop". The government officials might use the information on border

population and border income to adjust home state tax rates and take advantage of border tax liability. Thus, the argument is that the states consider the number of taxpayers who can relatively easily cross-border shop and contribute to the state's tax revenue. The use of border population and border income as tax rate determinants is an alternative approach to Case, Hines and Rosen (1989), who suggest taking into account home and neighboring population that lives in bordering counties. The argument of the importance of border population and income for tax competition is consistent with the tax competition literature (Case, 1993).

5.4.4 The *Political Party* Matrix for Equations (16) to (18)

The importance that political parties have on public policy has been widely examined by researchers. Joseph R. Star (1939) writes:

> "The political party is an agent in the formation of public opinion. It is widely believed that political parties crystallize public opinion at election times by presenting statements of policy to the voters."

Similarly, Sarah McCally Morehouse (1983) writes:

> "The political party has been declared a major independent contributor to policy making in the statewide model... In the statewide model, the kind of party organization was shown to be a major intervening variable between the needs of the statewide constituency and the satisfaction of those needs."

The current study attempts to account for state tax revenue composition on the basis of one party control of the state legislature and governorship. In reality, party membership has different meaning in different states in the United States. Despite the great diversity of party systems, ideologically, the conservatives are viewed as the ones who prefer lower taxes and taxes that are more regressive, such as general sales taxes. On the other hand, the liberals are viewed as the ones who prefer bigger government spending and more progressive taxes such as income taxes. The current study uses the Republican Party membership as a quantifiable criterion for identifying a conservative state legislature and governorship. In particular, the *Political Party* matrix has four variables that identify Political Party membership of state legislative and executive branches. These four variables identify the following: (a) if state House of Representatives is controlled by the Republican Party (*HRep*); (b) if the state Senate is controlled by the Republican Party (*SRep*); (c) if the Governor of state is a member of the Republican Party (*GRep*) and (d) if all three offices (House, Senate & Governor) are controlled by the Republican Party (*SHG*).[18]

The expected signs of these four variables (*HRep, SRep, GRep, SHG*) are expected to be positive for the general sales tax rate equation (16) and reflect officials' preference for higher regressive taxes. On the other hand, the expected signs *of HRep, SRep, GRep* and *SHG* are expected to be negative for the personal income tax rate

[18] The treatment of Nebraska's Legislature was slightly different from other states, given that Nebraska has the Unicameral Legislature (a single-house state legislature). In particular, if the Republican Party had a control over Nebraska's Legislature this was treated as if the Republican Party had control over both, House and Senate.

equation (17) and the corporate income tax rate equation (18). This would reflect officials' distaste for higher progressive taxes.

5.4.5 The *Neighbor* Matrix for Equations (16) to (18)

As stated before, tax competition between the neighboring states is based on tax rates. The changes in neighbors' tax rates have an effect on home state choice of tax rate, and therefore the composition of tax revenue. The *Neighbor* matrix contains the information on neighbors' tax rates lagged by one year, lagged neighbors' expenditure per capita (equations 17 & 18) and travel cost (equation 16). With respect to the neighbors' tax rates, the lowest general sales tax rate (*Neigh. Min GST Rate*), the highest personal income tax rate (*Neigh. Max PIT Rate*) and the highest corporate income tax rate (*Neigh. Max CIT Rate*) in the neighboring area are identified for the fifty states during the 1979-1999 period. The lowest and the highest tax rates in the neighborhood are identified for each state. These tax rates are used to capture interstate tax competition. The arguments for neighbors' lowest general sales and the highest personal income and corporate income tax rates are similar to the previous arguments for the tax shares. The states attempt to keep home residents and attract neighboring residents to engage in consumption by keeping low general sales tax rates and undercutting the neighbor with the lowest general sales tax rate. Therefore, it is expected for the lowest general sales tax rate in the neighboring states to have a negative effect on the home state's general sales tax rate. On the other hand, the higher that the "highest" income tax rate is for a particular tax source, the more policymakers can push for a tax rate increase, and the state can rely on this income tax without the danger of loss in voters' support and tax revenue

erosion. Therefore, it is expected for the highest personal income and the highest corporate income tax rates in the neighboring states to have a positive effect on the personal and corporate income tax rates in the home state.

Similarly, it is expected that a neighbor's per capita expenditures (*Neigh Expenditure PC*) can influence home income tax rates (equations 17 & 18). Given the fact that income taxes are the least popular ones, the home state taxpayers are assumed to compare their well-being to those of people in neighboring states and to follow Hirschman's voice model. According to the voice model the resident voters compare states' fiscal performance. The policymakers are assumed to remind home residents of public goods provided by the neighboring states and therefore propose an increase in income tax rates. Neighbors' spending per capita is calculated as the average government spending of a state's geographic neighbors lagged by one year. Neighbors' spending per capita is expected to have a positive effect on the level of home state income tax rates.

It is assumed that the general sales tax rate (equation 16) depends on cost of traveling that is associated with cross-border shopping. Cross-border shopping will only occur if tax differentials exceed travel costs, so the travel cost variable adds an explanatory variable for the general sales tax rate equation (16). This variable (TravelCost) accounts for the cost of traveling between bordering counties. The TravelCost variable is calculated as a product of the distance between the bordering counties' centroids and the IRS mileage rate. The geography division of the U.S. Census Bureau, U.S. Department of Commerce, computes the population centers of the state

counties. The computation is done based on county population.[19] The distance between these population centers is obtained among the bordering counties for the fifty United States. In addition, the mileage rate is obtained for the 1979-1999 period. The *Travel Costs* variable (*Travel Costs* = Distance * IRS mileage rate (expressed in dollar terms)) is expected to have a positive effect on the general sales tax rate and to reflect the higher cost of cross-border shopping (Kanbur & Keen, 1993).[20]

5.4.6 The *Income* Matrix for Equation (16) and Equation (17)

The *Income* vector is used in the general sales tax rate equation (16). This vector contains the information on state median income (*Median Income*). The *Median Income* variable captures the level of state median income, which is expected to have a positive effect on the state general sales tax rate.

Similarly, the *Income* matrix is used for the personal income tax rate equation (17). The two variables in the *Income* matrix are median income (*Median Income*) and the percentage of state households that earn $100,000 or more (*HHincome $100K*). It is expected that the level of median income will have a positive effect on the state personal tax rate. On the other hand, the percentage of households that earn $100,000 or more

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[19] Detailed discussion about the method used in determining the centers of county population can be obtained from the U.S. Department of Interior, U.S. Geological Survey, Internet site <http://mac.usgs.gov/mac/isb/pubs/booklets/elvadist/elvadist.html>.

[20] Despite the age of e-commerce and ease of "on-line" shopping, the majority of states' tax revenue loss is due to the cross-border shopping. The fact that e-commerce activities are not taxable (excluding the Physical Nexus aspect) and that all states experience sales tax revenue losses due to this exclusion of e-commerce and catalog sales from a sales tax base, further contributes to the current study's argument about the importance of the neighbors and their residents' cross-border shopping.

intends to measure the state's high-income people and the influence of their lobby on tax decisions. The *HHincome $100K* variable is expected to have a negative effect on the personal income tax rate.

5.5 Data Sources

This section presents the data to be used for estimating the tax composition model. The data employed by the current study were collected for a 21-year period, beginning with fiscal year 1979. Given the scope of this study, the data come from many different sources and represent a unique set of information on the fifty states during the 1979-1999 period.

By focusing only on tax revenue composition, this research purposely abstracts from the role of special provisions and individual tax structure, as data limitations make it impossible to employ the more comprehensive definition of tax structure. Therefore, for the purposes of investigating the interdependence of tax shares within one state and across the states and over time, observations on state governments are utilized. The data used by this study are presented in Table 4. Specifically, individual tax share data is taken from State Government Tax Collections 1979-1999, U.S. Department of Commerce, Bureau of the Census. The percent distributions of state government tax revenue for the personal income, general sales and corporate income taxes are calculated from these data. Similarly, data for state government expenditure by state, for the period 1979-1999, are collected from State Government Finances, U.S. Department of Commerce, Bureau of the Census.

The data on state personal income tax rates, general sales tax rates and corporate income tax rates are collected from the Federation of Tax Administrators data bank, State Tax Handbooks and *Facts and Figures on Government Finance* published by the Tax Foundation.

Data for political cost variables (ratios among state personal income, corporate income tax base and retail and service receipts) are collected from several sources. In particular, state personal income data are obtained from the U.S. Bureau of Economic Analysis. The levels of the state corporate income tax base are calculated as the ratio of tax revenue collected from the corporate income tax source divided by the top corporate income tax rate. The data on state retail and service receipts are obtained from the *Statistical Abstract of the United States*, the U.S. Department of Commerce, Bureau of the Census.[21]

For the empirical model, the demographic information is obtained from a variety of sources. The demographic information that reflects income and population characteristics is obtained from the *Statistical Abstract of the United States*, the U.S. Department of Commerce, Bureau of the Census. The information on population characteristics consists of the percent of people who are prime working age. State population and population by age data are obtained from the *Census of Population and Housing*, Bureau of the Census, the U.S. Department of Commerce.

In addition, information about each state's labor force and sectoral employment (farm, mining, construction, manufacturing, trade, transportation and finance) is obtained

[21] Given that data on service receipts are obtainable only for every five years, the observations between the five years have been interpolated.

from a variety of sources. In particular, the U.S. Bureau of Labor Statistics, and U.S. Bureau of Census, Economic Census and Annual Survey of Manufacturers data sets during the 1979-1999 period are utilized.

The information on Political Party variables is obtained from www.PoliSci.Com: *The Political Reference Almanac,* Internet site <http://www.PoliSci.com/almanac/Local>.

The information on IRS mileage rates is obtained from the U.S. Bureau of Census *Master Tax Guide.* The information on the distance between the bordering counties' centroids is obtained from the U.S. Department of Commerce, U.S. Census Bureau, Geography Division.

The information about the bordering counties in the United States is obtained from the National Association of Counties, Internet site <http://www.naco.org/>. The data for estimating the effects of the border market (neighbors' border population and their income as well as the home state's border population and income) are obtained from the Bureau of Economic Analysis, Regional Accounts Data, Local Area Personal Income, Internet site <http://www.bea.doc.gov/> and from the U.S. Census Bureau, Internet site <http://www.census.gov>.

Chapter 6

Estimating Technique and Empirical Findings

This chapter explains the estimating technique employed by the current study and reveals the study's empirical findings. The findings are broken down separately for the tax share (Table 7) and the tax rate (Table 8) equations. The data set used by the current study is a panel consisting of fifty states over the twenty-one year period for total of 1050 observations. Estimating technique employed here is the three stage least squares technique.

6.1 Estimating Technique

Equations (13) to (15) and (16) to (18) are estimated jointly using panel data for fifty states during the 1979-1999 period. This system of equations is tested using simultaneous equation technique.[22] The model is one where tax shares and tax rates are jointly determined -- all six equations are needed to determine the equilibrium tax shares and tax rates. This interdependence implies that some regressors are stochastic and correlated with the disturbance term. OLS may be applied to estimating this system; however, the estimators under OLS may be biased in the presence of simultaneity. Therefore, this study employs a full-information estimation method -- three-stage least-squares – and compares the results with a couple of the alternative ones.

[22] In order to execute the robustness checks, two more estimating techniques are employed by the current study. Detailed discussion of these techniques as well as the obtained results are presented later in this chapter and in Appendix 3, respectively.

Three-stage least-squares is the baseline technique used in the current study. Three-stage least-squares technique is usually used for joint estimation of the entire system of equations. Three-stage least-squares is an estimating procedure that estimates *all* six equations (13) to (18) together as a set. Three-stage least-squares complements two-stage least-squares, which is a "single-equation" estimation method. Two-stage least-squares is a special case of the instrumental variable technique, an estimation procedure applicable when the independent variables are not independent of the disturbance term. Two-stage least-squares method is a single-equation method in the sense that it estimates a system of simultaneous equations by estimating each equation separately. This method ignores restrictions in *all* equations in the system, except the one being estimated. In order to produce "legitimate" instrumental variable estimators, the two-stage least-squares method combines *all* exogenous variables to create a combined instrumental variable. Two-stage least-squares, being the instrumental variable technique in general, produces consistent estimators. However, these estimators may be inefficient compared to the estimators that make use of cross-equation correlations of the disturbances, such as three-stage least-squares (Greene, 1993). That is, estimators that are more efficient can be obtained if the additional information contained in the *entire system* of equations is considered. These more efficient estimators are obtained based on the generalized least squares principle that is used by the three-stage least-squares technique.

Three-stage least-squares is composed, unsurprisingly, of three steps. The first step involves estimation of two-stage least-squares estimates of the identified equations. Each equation is transformed by the transpose of the matrix of observations on all the

exogenous variables in the system and the generalized least squares method is applied to this new relationship. This creates the two-stage least-squares estimates. In the second stage, the structural equations' errors and their contemporaneous variance-covariance matrix are estimated using the two-stage least-squares estimates computed in stage one. Finally, in the third stage all the transformed equations from stage one are rewritten as a "single, very large equation" (Kennedy, 1998) and the generalized least squares method is applied. This produces the three-stage least-squares estimators. Given that the nonspherical disturbance of this "very large equation" can still have nonzero correlations between the disturbances of different equations, the contemporaneous variance-covariance matrix of the structural equation's disturbances must be estimated in the third stage.

There are several advantages of applying the three-stage least-squares technique to a system of equations (13) to (18). In general, the three-stage least-squares estimator is consistent and asymptotically more efficient than the two-stage least-squares one. Given that the three-stage least-squares method utilizes the knowledge of *all* restrictions in the *entire* system when estimating the structural parameters, it results in a smaller asymptotic variance-covariance matrix than the single-equation estimators. On the other hand, if the disturbances in the structural equations are indeed uncorrelated, that is to say that the contemporaneous variance-covariance matrix is diagonal, three-stage least-squares (3SLS) will reduce to two-stage least squares (2SLS).

In addition to the three-stage least-squares method, the full-information method is also available for estimating a system of simultaneous equations. The current study is not relying on this particular method for couple of reasons. First, if there is a specification

error in one or more equations of the system, that error is transmitted to the rest of the system and consequently, the entire system becomes sensitive to specification errors. Second, the full-information maximum likelihood method is more appropriate for non-linear system of equations and therefore, the computational costs of the full-information maximum likelihood method are enormous. Therefore, given the characteristics of the three-stage least square method and its strengths compared to the two-stage least-squares and the full-information maximum likelihood methods, the three-stage least squares technique is applied by the current study as the baseline approach to estimating a system of equations presented earlier.

6.2 Identification Problem

The identification problem is associated with a simultaneous equation system. This problem raises a question of the possibility of obtaining meaningful estimates of the structural parameters. If the estimates of the structural parameters do estimate these parameters and not something else, the parameters are considered to be identified. Therefore, each equation in a system of simultaneous equations (13) to (18) is checked to see if its structural parameters are indeed identified. Economic theory can be used to place restrictions on the set of simultaneous equations and therefore solve the identification problem. Another way to check whether or not a system of simultaneous equations has enough restrictions to circumvent the identification problem is to check for order and rank conditions. The *order condition* is a necessary condition for identification; however, it is not sufficient. The order condition requires counting included and excluded variables in each equation. An equation is considered to be

identified if the number of excluded predetermined variables in the equation is greater than or equal to the number of included endogenous variables minus 1. In other words, an equation is identified if it contains information that is not included in another equation. Equations (13) to (18), and therefore the entire system, meet the order condition. More precisely, the system of equations (13) to (18) is over-identified, given that it has extra restrictions beyond the minimum necessary to be identified.

The identification problem is fully addressed if the *rank condition* is satisfied as well. The rank condition requires that no linear combination of the *other* equations in the system can produce the i-th equation. For the system of simultaneous equations (13) to (18) the rank condition is satisfied, and this is sufficient for the identification problem.

6.3 Estimated Findings

This section reports the current study's empirical findings separately for the tax share and the tax rate equations. The data set used is a panel consisting of fifty states over a twenty-one year period for a total of 1050 observations. The summary statistics for all the variables used in this analysis are reported in Table 5. The descriptive statistics uncover some interesting information regarding the states' reliance on the three taxes. For instance, the maximum reliance on the general sales tax is 61.64 percent (Washington, 1989), while the highest general sales tax *rate* is at 7 percent (Rhode Island). Similarly, the highest reliance on personal income tax is 69.45 percent, while the highest personal income tax *rate* is 26.5 percent (Oregon, 1999). The descriptive statistics in Table 8.1 also reveal the highest state reliance on corporate income tax, 39.32

percent (Alaska, 1980) and the highest corporate income tax rate -- 12 percent (Michigan).

In terms of industrial mix, the descriptive statistics shown in Table 5 uncover some interesting information regarding the percentage of state employment by seven industries. For instance, North Dakota leads in the percentage of farm employment (22.01 percent) while Rhode Island's share of the farm employment is the lowest of all (0.32 percent). Wyoming has the highest share of the mining employment (19.93 percent). The highest employment shares in construction, 13.65 percent (Alaska, 1983), manufacturing, 50.38 percent (Rhode Island), and transportation, 14.75 percent, (Alaska, 1979) are also presented in Table 5. The employment shares in the trade sector range from 23.2 percent (South Carolina, 1979) to 42.96 percent (Maryland, 1981). The employment share of the finance sector ranges from 3.92 (West Virginia, 1979) to 13.7 percent (Delaware, 1997) with an average of 6.46 percent.

With respect to state demographic characteristics, the descriptive statistics show a marked difference in state per capita spending – starting from $682.28 (Florida, 1979) to $9,912.12 (Alaska, 1999), with an average state per capita spending of $2,403.14. Similarly, the percentage of state prime-age population ranges from 54.63 percent (Mississippi, 1989) to 76.39 percent (Alabama, 1980) with an average of 60.94 percent. State median income ranges from $ 17,672 (Mississippi) to $ 75,505 (Connecticut) with an average median income being at $ 11,720.03.

Interesting statistics are uncovered regarding the neighboring states' highest personal and corporate income tax shares. For instance, Nevada borders the state with the maximum personal income tax share in the nation (Oregon), while Vermont borders

the state with the maximum corporate income tax share in the continental U.S. (New Hampshire).

In order to explore the strength of linear association among the variables, correlation analysis of six equations is performed. The correlation coefficients between the variables and their respective probability values are presented in Table 6. In particular, the correlation coefficients presented in Table 6 quantify the direction and the magnitude of correlation among the chosen variables. The results suggest that a significant correlation exists among the employment shares of some of the industries. For instance, the employment shares of the construction and the manufacturing sectors are significantly correlated with the employment shares of all other sectors. On the other hand, no significant correlation is found between the employment share of the agricultural and trade sectors or between the finance and transportation sectors. A significant correlation between state population and employment share is also found. Given that industrial employment depends highly on the labor supply, this correlation should not come as a surprise. Furthermore, the results suggest no significant correlation between the political costs of either income tax. However, a significant correlation is found to be present between the two political cost variables that determine state reliance on general sales taxes. Similarly, the correlation coefficients of political party variables suggest a negative correlation between Republican Party control over state houses and the levels of state general sales tax and personal income tax rates. Similarly, a negative correlation between Republican Party control over the state senates and state personal income tax rates exists. These and some other correlations between the variables employed by the current study are presented in Table 6.

In addition to the above-mentioned statistics, this chapter reveals the current study's empirical findings. These findings are broken down separately for the tax share and the tax rate equations. The baseline results obtained from the 3SLS are discussed in the following sections. These baseline results for the tax hares and tax rates are reported in Table 7 and Table 8, respectively.

6.4 The Results for Tax Share Equations (13) to (15)

The following section examines the effects of political cost forces on general sales, on personal income and on corporate income taxes. Furthermore, this section presents the effects of industrial mix and state demographic characteristics on the three tax shares, and the effects that interstate tax competition has on a state's tax mix choice. The baseline results for tax share equations are obtained from 3SLS and are reported in Table 7.

6.4.1 The Effects of Political Costs on Tax Shares

The empirical results indicate that political costs play different roles in the three kinds of taxes. As expected, the political cost for the general sales tax is negative and significant with respect to the personal income tax (*Political Cost GST/PIT*), Table 7. This implies that if more revenue is raised from a potential general sales tax base relative to the alternative personal income tax base, political opposition will increase from those on whom the general sales tax will fall. Government officials can therefore anticipate potential political opposition and take steps to minimize their reliance on general sales taxes.

The opposite result is obtained regarding the political cost for a general sales tax with respect to the alternative corporate income tax (*Political Cost GST/CIT*). The coefficient estimate on this political cost proxy implies that, if faced with an option of choosing between heavier reliance on general sales taxes or alternative corporate income taxes, policymakers would benefit from choosing the general sales tax. The argument can be made that, if this proxy indeed reflects the political costs, government officials may expect high political costs if they increase their state's reliance on corporate income tax. Therefore, the least costly strategy is increased reliance on the general sales tax. Thus, the formation of a "business friendly environment" involving lower reliance on the corporate income tax could potentially be the least costly strategy for policymakers. At the same time, government officials tend to take advantage of the general sales tax source. One such advantage is a low administrative cost for general sales taxes. Additionally, the results obtained by the current study suggest low political costs of general sales tax, at least relative to the corporate income tax.

Further results regarding the political cost proxies suggest no significant effect of alternative general sales tax bases on corporate income tax reliance (*Political Cost CIT/GST).* However, the previous findings of low general sales tax political costs relative to the corporate income tax are consistent with the findings of no political costs regarding corporate income tax relative to the general sales tax. The argument can be made that policymakers do not expect high political costs from greater reliance on general sales tax relative to corporate income tax. The least costly policy could be facilitating private sector investment activities by not increasing their state's reliance on the corporate income tax.

The result regarding the political cost for the corporate income tax with respect to the alternative personal income tax base (*Political Cost CIT/PIT*) suggests a negative effect of this political cost proxy on the corporate income tax (Table 7). A negative sign on this political cost proxy implies a rise in political opposition if a state increases reliance on corporate income tax sources versus personal income tax sources. Given that both are taxes on income and not on consumption, this finding can suggest that policymakers should carefully balance state reliance on these two income tax sources. In other words, given the criticism that business investment is taxed twice with income taxes, a rational evaluation of the tax system might increase policymakers' chances for reelection. The argument can be made that rational evaluation of a state's reliance on both personal income tax and corporate income tax sources may reduce the need for state officials to go to the voters to increase tax rates, which is politically undesirable (Hy & Waugh, 1995).

Finally, the political costs of the personal income tax with respect to the alternative general sales tax base (*Political Cost PIT/GST*) and with respect to the alternative corporate income tax base (*Political Cost PIT/CIT*) are not found significant determinants of a state's choice of tax revenue portfolios.

In summary, the obtained results suggest high political costs of the general sales and corporate income taxes relative to the personal income tax. These findings reflect the underlining growth trend of the three tax sources which, in turn, affects the changes in potential tax bases. Therefore, the implication of the results is that relatively more stable sources (personal income tax) are relied upon more extensively. The importance of tax stability has been widely analyzed in economic literature. For example, Fox and

Campbell (1984) examined the income elasticity of ten categories of sales tax revenue. They found the sales tax to be a highly unstable source as its elasticity falls in recession and rises in expansions. Similarly, Hettich and Winer (1984) argue that states tend to rely less heavily on tax sources that are more variable. The argument is that dependence on the relatively unstable tax source increases the tax burden relative to the costs of organizing opposition and thus decreases a state's reliance on particular tax source.

6.4.2. The Effects of Industrial Mix and State Demographic Characteristics on Tax Shares

The purpose of this section is to present the estimated impacts of different economic activities on state tax revenue mixes. The baseline results, presented in Table 7, support the earlier hypothesis number two. The argument was made that state tax revenue portfolios depend upon characteristics of a state's private economy and the dominance degree of a particular sector.[23] The examined industries can be divided into three categories: (i) industries that affect state tax mix by affecting only one tax source; (ii) goods-producing industries; and (iii) service-producing industries that affect more than one tax source.

The agricultural, construction and trade sectors all belong to the first category – industries that affect state tax mix by impacting only one tax source. The dominance of the agricultural (*Farm*) and construction (*Construction*) sectors intensify a state's reliance on the personal income tax while dominance of the trade sector (*Trade*) lowers a state's

[23] See Musgrave (1979), Tait, Gratx and Eichengreen's (1979), McLure (1967, 1981), White (1986) and Merriman and Skidmore (1997).

reliance on the corporate income tax. In particular, an increase in the agricultural sector's employment share stimulates 0.339 percent higher reliance on the personal income taxes. This finding is consistent with Lewis (1976), who found a positive effect regarding an increase of farm sector's employment on income tax reliance in Pakistan. Furthermore, a significant role of the construction sector in determining state tax revenue mix is suggested by the findings presented in Table 7. The results imply the propensity to increase state reliance on personal income taxes by 0.601 percent as the construction sector becomes more dominant. Finally, the trade sector appears to contribute to variation in the corporate income tax but not in the general sales and personal income taxes. The results suggest that states appear to use corporate income taxes less intensively (0.309 percent) as the trade sector becomes more dominant.

The second group of industries -- goods-producing -- consists of the mining and manufacturing sectors. A dominance of the mining sector (*Mining*) intensifies a state's reliance on the general sales tax and lowers reliance on the corporate income tax. More precisely, a 1.0 percent increase of the employment share in mining sector enhances a state's reliance on the general sales taxes by 0.964 percent and decreases reliance on the corporate income tax by 0.407 percent. The manufacturing sector (*Manufacturing*) also seems to contribute to variation in a state's reliance on the general sales and personal income taxes. The results suggest that a 1.0 percent increase in the manufacturing sector's employment share leads to a 0.291 percent higher reliance on the general sales tax and a 0.213 percent lower reliance on the personal income tax. Lewis (1976), who analyzed the revenue implications of changing industrial structure in Pakistan, also obtained a positive and significant effect of the manufacturing sector on the general sales

tax. Similarly, the finding of lower reliance on the personal income taxes is consistent with Rork's (2000) work. Rork argues that this particular result indicates "a high concentration of low wage earners in the manufacturing sector that results in a larger part of the population falling into lower income brackets of progressive state."

Given that both manufacturing and mining sectors are considered to be "goods-producing" sectors, the baseline results suggest that states appear to use the sales taxes more intensively when these industries become more dominant. Conversely, with respect to the income taxes, it appears that states lessen their reliance on these two taxes as the employment share in manufacturing (PIT) and mining (CIT) sectors increase. This can suggest that states recognize a fair immobility of the mining and (somewhat) manufacturing sectors and substitute higher general sales taxes for the personal income and corporate income taxes.

Finally, the third set of industries, service-producing ones, consists of the transportation and finance sectors. The dominance of the transportation sector (*Transportation*) enhances the use of the income taxes and lessens the reliance on the general sales taxes. More precisely, the results suggest that a one percent increase in employment share in the transportation sector leads to higher reliance on the personal income (0.52 percent) and corporate income taxes (0.384 percent) and lower reliance on the general sales tax (0.91 percent). Given that the transportation sector is considered to be a service-producing sector, the results reveal a practice of using the corporate income tax for collecting revenue from transactions within this particular service-producing sector. Regarding the effects of the transportation sector on the general sales tax, many tax analysts have suggested that expanded tax exemptions for service-producing sectors

have gradually narrowed the general sales tax base and thus made this tax source less productive (Fox, 1998).

The finance sector's dominance (*Finance*) contributes to variations in income taxes by boosting the reliance on the corporate income tax and bringing down the reliance on the personal income tax. In particular, an increase in the finance sector's employment share leads to a higher reliance on the corporate income tax (0.582 percent) and lower reliance on the personal income tax (1.4 percent). The opposite responsiveness of the two income taxes concerning the growth of the finance sector suggests that states substitute high corporate income for the personal income taxes, at least in the case of the finance sector's dominance. These results are consistent with Hansen's (1983) argument that corporate income taxes are generally designed to capture some portion of corporations' wealth.

State income per capita, prime age, population and expenditures per capita are additional determinants of a state's tax revenue mix. One would expect a state's tax revenue composition to depend on the amount of income earned within its borders. The baseline results suggest that state's per capita income does not appear to be a significant determinant of any tax source in question. This is a somewhat surprising finding given the expectation that if personal income is higher, more taxable and more disposable income becomes available. However, this particular finding is consistent with previous work such as the study by Tait, Gratx and Eichengreen (1979). These authors also found no significant correlation between income and tax shares in sixty-three developing countries.

With respect to a state's working population, this study finds no significant effect of an increase in state's working population on the three tax shares. Therefore, Metcalf's (1993) findings cannot be supported in this study.[24] On the other hand, it appears that the higher spending states rely less on all three taxes. For instance, a $100 increase in a state's expenditure per capita negatively affects state reliance on the general sales and corporate income taxes (0.2 percent) and personal income taxes (0.1 percent). The argument for a negative coefficient on state expenditure can be that the current study considers the three tax sources (general sales, personal income and corporate income taxes) all of which comprise about seventy-five percent of states own tax sources. These three tax sources do not constitute *all* of the states tax revenue, and it could be that these other sources drive the results (Feenberg & Rosen, 1987). One can argue that high spending states, in order to collect revenue for government programs, collect their revenue from sources other than general sales, personal income and corporate income taxes.

State population appears to have different effects on the three tax revenue sources and the resulting tax revenue mix. The results suggest that highly populated states have a propensity to increase their reliance on the general sales taxes. On the contrary, no significant effect of state population was found on either personal income or corporate income taxes.

[24] Metcalf's (1993) findings suggest that a state's prime working age residents prefer fewer taxes collected from general sales and personal income taxes.

6.4.3 The Effects of Tax Competition Variables on Tax Shares

The empirical results obtained the current study suggest that the neighboring states' tax revenue mixes affect the home states' tax revenue mixes. The coefficient estimates on the lowest general sales tax shares (*Neigh. Min GST*) suggest a tendency to lower the home state reliance on the general sales taxes by 0.123 percent because of neighboring states' general sales tax policy. It appears that the interstate tax competition between geographic neighbors as well as the rise of electronic commerce are increasing the pressure to keep state reliance on general sales taxes as low as possible. The results indicate that states try to undercut their neighbor with the lowest general sales tax share. The need to keep general sales taxes lower than that of the neighbor's is enhanced by the cross-border shopping phenomenon (Kenyon & Kincaid, 1991; Kanbur & Keen, 1993) as well as purchasing opportunities offered by the Internet. This particular finding is consistent with Goolsbee (1998), who argues that the lower general sales taxes have significant effects on Internet purchases as well as on some coordination of tax policies among the states.

The estimated effects of neighboring states' highest personal income tax share (*Neigh. Max PIT*) on a home state's choice of tax revenue portfolio suggest the tendency to follow the neighbor with the highest personal income tax share by increasing the home state personal income tax by 0.057 percent. The argument can be made that if government officials use the neighbor with the highest personal income tax share as a "benchmark" for their own reliance on personal income tax, then any changes in their neighbors reliance on this tax source will stimulate changes in the home state's tax mix. Politically speaking, as neighbors increase their reliance on personal income tax,

policymakers in the home state can remind their electorate of such action, and advocate an increase in their home state's own reliance on personal income tax as a way of obtaining higher level of public goods and services.

The findings of the current study suggest no significant effect of the neighbors highest corporate income tax share (*Neigh. Max CIT*) on home state reliance on the same tax source. Therefore, no support for the hypothesis of interstate tax competition based on state reliance on corporate income tax is provided.

Furthermore, the baseline results suggest positive effects of a state's tax rates on state reliance on their respective tax sources. One percent increases in each tax rate (the general sales, personal income and corporate income tax rates) are expected to intensify a state's reliance on their tax shares by 0.554, 0.184 and 0.47 percent, respectively. As predicted by the theory, a higher tax rate will result in higher tax shares.

6.5 The Results for Tax Rate Equations (16) to (18)

This section presents the results obtained from estimating the determinants of states' own tax rates using 3SLS techniques. The results for general sales tax rate, personal income tax rate and corporate income tax rate are presented in Table 8.

6.5.1 The Results for Interdependence among Home Tax Rates

The interdependence among a state's own general sales tax, personal income tax and corporate income tax rates is tested in this study -- hypothesis number five. The results suggest a significant interdependence between the general sales (*GST Rate*) and corporate income tax rates (*CIT Rate*). The findings presented in Table 8 indicate that the

general sales tax rate and the corporate income tax rate have a complementary relationship. More precisely, a one percent increase in the corporate income tax rate enhances a 0.025 percent rise in the general sales tax (*GST Rate* equation) and a one percent rise in the general sales tax rate stimulates a 0.244 percent rise in the corporate income tax rate (*CIT Rate* equation).

Furthermore, the results suggest a positive and significant effect by the corporate income tax rate on the personal income tax rate (*PIT Rate* equation). The interdependence between the two income tax rates suggests that a one percent increase in a state's corporate income tax rate boosts a state's personal income tax rate by 0.281 percent. No significant effect of the general sales tax rate level on the level of the personal income tax rate (or vice versa) is found.

6.5.2. The Effects of Previous Reliance on Taxes

The estimated effects of a state's previous reliance on general sales tax (*GST Lag*) and personal income tax (*PIT Lag*) suggest a positive and significant effect on a state's general sales tax rate and personal income tax rate, respectively. In particular a 0.025 percent increase in the general sales tax rate and 0.349 percent increase in the personal income tax rate is implied if a state's reliance on these tax sources went up. These findings are consistent with some previous work that argues that the best tax rate determinant is the state's previous reliance on these particular taxes (Penniman, 1971). In terms of a state's previous reliance on the corporate income tax (*CIT Lag*), the estimated effects suggest a reduction in the corporate income tax rate by 0.052 percent if a state's previous reliance on corporate income tax increased.

6.5.3 The Effects of Border Market on Tax Rates

Measures of the border market magnitude served by the home state are employed as the determinants for the general sales tax rate, personal income tax rate and corporate income tax rate. The coefficient estimates on the percentage of home border population (*Home Border Pop*) indicate that as home border population increases, a state's general sales tax and personal income tax rates decrease. More precisely, a one percent increase in the home state border population is estimated to reduce the state general sales tax rate by 0.028 and the personal income tax rate by 0.161 percent. The argument can be made that as more people reside in bordering counties, home states try to prevent these residents from cross-border shopping by lowering their own general sales tax rates. In addition, policymakers also tend to reduce state personal income tax rates in order to prevent possible out-migration. The finding of a general tendency for lower general sales and personal income tax rates when a high percentage of home state population lives on or near the state's border supports the argument of the importance of cross-border effects.

The estimated effects of neighboring states' border population (*Neigh. Border Pop*) suggest that it has a positive effect on the general sales tax rate and a negative effect on two income taxes in home state. A one percent increase in neighbors border population is expected to raise a home state's general sales tax rate by 0.027 percent and lower the personal income and corporate income tax rates by 0.285 and 0.102 percent, respectively. The argument can be made that by increasing the general sales tax rate, home states aim to collect more general sales tax revenue from non-residents. These

results also provide strong support for tax competition that is consistent with work of Kanbur and Keen (1993).

As suggested by Case, Hines and Rosen (1989), the percentage of state income earned in bordering counties of the home state (*Home Border Income*) and the percentage of income earned in neighboring states' border counties (*Neigh. Border Income*) are employed to capture policymakers considerations, if any, of changes in income earned by the bordering counties. The estimated effects of the *HomeBorder Income* variable on a state's general sales and corporate income tax rates suggest higher tax rates when more income is earned by the home state's bordering counties. A one percent increase in income earned by the bordering counties is expected to increase the general sales tax rate by 0.031 percent and the corporate income tax rate by 0.15 percent. These findings suggest that the home state's government officials take into consideration bordering counties' income when determining these two tax rates.

With regard to the effect of income earned by neighboring states' bordering counties (*Neigh. Border Income*), the results suggest that income earned in these counties does not have a significant effect on the home state general sales tax rate or personal income tax rate. However, an increase in the income earned by the neighbors' bordering counties will decrease the home state's corporate income tax rate by 0.197 percent.

6.5.4 The Effects of Political Party Membership on Tax Rates

Earlier in this study, it has been hypothesized that party control of the state House, Senate and Governorship plays an important role in determining state tax policy. The coefficient estimates on the Republican Party control over the state House (*HRep*)

suggest no significant effect on the general sales tax rate, personal income tax rate nor corporate income tax rate. Furthermore, the estimated effects of the Republican Party control over the Governorship (*GRep*) imply that, if a state Governor is a member of the Republican Party, a lower general sales tax rate and a higher personal income tax rate can be expected. Although the Republican Party is perceived to support regressive taxes, these somewhat different findings can be explained by the fact that voters of the entire state elect a Governor (as opposed to the district-specific candidates like House and Senate representatives). Hence, the Governor must address the preferences of all income groups and not follow his/her political party preferences. Likewise, the argument can be made that liberal Republicans dominate the data used in this study and therefore drive the results. This argument is similar to Hansen's (1983) who debates that "many Northern, Midwestern, or Western states adopted progressive income taxes under Republican governors" (Hansen, 1983, pp. 428). However, with respect to corporate income tax rate, this study finds no significant effect of a state Governor's party affiliation on the level of a state's corporate income tax rate.

The coefficient estimates of the Republican Party's control over the state Senate (*SRep*) suggest that if members of the Republican Party do control the Senate, a lower personal income tax rate and a higher corporate income tax rates can be expected. The traditional view that conservatives prefer lower personal income taxes is also supported by the results of this study. The empirical results indicate no significant effect of the Republican Party's control over the state Senate on the level of the general sales tax rate.

A different result is obtained when members of the Republican Party control all three (House, Senate and Governorship) branches. In particular, the coefficient estimates

on the Republican Party's political power variable (*SHG*) suggest no significant effect on state choice of either a personal income or corporate income tax rates. On the other hand, the results suggest higher general sales tax rates when the Republican Party controls all three branches and therefore has political power (Table 8). This finding is consistent with the traditional view that members of the Republican Party prefer higher general sales taxes; i.e., more regressive taxes.

6.5.5 The Effects of Interstate Tax Competition on Tax Rates

This study analyzes the existence of interstate tax competitions among geographic neighbors and around state tax rates. In that context there were two hypotheses presented earlier in the study. One is hypothesis number three that argues for a negative relationship between neighboring states' general sales tax rate and the home state's general sales tax rate. The empirical analysis specifies the interstate tax competition, which is based on the general sales tax rate, to be around the lowest general sales tax rate available in the neighboring states. The second hypothesis (number four) argues for a positive relationship between the income taxes of neighboring states and the home state. In terms of tax competition, the interstate tax differentials are qualified by assuming tax competition that is based on the highest personal income tax rate and the highest corporate income tax rate available in neighboring states.

The coefficient estimates on the neighboring states' general sales tax rate (*Neigh. Min GST Rate*) suggest no significant effect on the home tax rate. This does not support hypothesis number three that argues that states undercut neighbors with the lowest general sales tax rate. Estimated effects of the neighbors' highest personal income

(*Neigh. Max PIT Rate*) and corporate income tax rates (*Neigh. Max CIT Rate)* on a state's own personal income tax rate also suggest no significant effect of either the *Neigh. Max PIT Rate* or *Neigh. Max CIT Rate* variable on the home state personal income tax rate.

In terms of interstate tax competition, neighboring states' expenditures per capita (*Neigh. Expenditure PC*) is employed for the three tax rates. The results advocate that the neighboring states' expenditure per capita is not a significant determinant of any of the home state's tax rates.

Generally, neighboring states' taxpayers engage in cross-border shopping at a certain cost. Travel costs estimated effects on the home state general sales tax rate indicate that as transportation costs increase, the general sales tax rate rises as well. Thus, the argument can be made that as the gap between the tax differential and travel costs narrows, the home state increases its general sales tax rate. Such a finding provides strong support for tax competition consistent with work of Kanbur and Keen (1993).

6.5.6 The Effect of Income Level on State General Sales and Personal Income Tax Rates

The coefficient estimates on the median income variable (*Median Income*) suggest a negative and significant effect of state median income on the general sales tax rate and personal income tax rate. The argument can be made that as a state's median income increases, the policymakers have a propensity to decrease two tax rates and likely impose new levies. These new levies can take the form of higher taxes (other than general sales tax and personal income tax) or arise from the imposition of new forms of taxes, which are becoming increasingly popular.

The effect of households with high income (number of households that earn $100,000 or more, *HH Income $100K*) is estimated in order to show their effect on personal income tax rate. The estimated effects of high-income households imply that state personal income tax rates increase as more high-income households reside in a state. The argument can be made that as the number of households with high-income increases, the potential personal income tax base increases as well. Therefore, government officials expand their state's reliance on personal income tax by increasing the personal income tax rate. Given the popular belief that high-income earners are always able to avoid taxes, the argument can be made that policymakers consider this possibility while deciding on the level of the state personal income tax rate and consequently the state's reliance on personal income tax source.

6.6. Summary of the Findings

All of the findings presented in this section can be summarized as follows:

1) Political costs play a significant role in determining state tax revenue portfolios. Particularly, if the political cost proxies indeed reflect voters' political opposition to particular taxation, the results imply high political costs for choosing higher general sales and corporate income taxes relative to personal income tax. On the contrary, low political costs of choosing general sales tax relative to corporate income tax are suggested by the results.

2) State tax revenue portfolios depend on industrial mix of a state. Specifically, a rise of employment share of the mining and manufacturing sectors intensify the use of the general sales tax, while a dominance of the transportation sector lowers a state's reliance on general sales tax. Furthermore, the greater dominance of the finance and transportation sectors stimulate use of the corporate income tax, while a rise in the employment share in trade and mining sectors have a negative effects

on corporate income tax share. As the agricultural, construction and transpiration sectors become predominant, the reliance on personal income tax increase, while the dominance of the finance and manufacturing sectors lowers state's reliance on personal income tax.

3) More populated states rely heavily on general sales taxes, while higher spending states rely less on the three taxes.

4) Interstate tax competition based on state reliance on general sales and personal taxes is supported. However, there is no evidence that neighboring state's tax rates or expenditure per capita has an effect on the level of the home state tax rates.

5) The interdependence between the general sales and corporate income tax rates is detected, as well as the interdependence between the income tax rates.

6) A state's previous reliance on particular tax source is a significant determinant of the level of state's tax rates. Similarly, as the levels of the home state tax rates increase, the reliance on their respective taxes increases as well.

7) An increase in the size of home border market (*Home Border Pop*) result in a tendency to lower general sales and personal income tax rates. However, as the size of the neighbors' border market increases (*Neigh. Border Pop*) the tendency to raise general sales and lower income tax rates emerges. The purchasing power of home state border market (*Home Border Income*) has a positive effect on general sales and corporate income tax rates in the home state. Nevertheless, as the purchasing power of the neighbors' border market increases (*Neigh. Border Income*), lower corporate income tax rate can be expected.

8) The state general sales tax rates decrease with the Republican control of state Governorship and increase if the Republican Party has broader political power. Similarly, if the Governor is Republican, there is a tendency to increase the state personal income tax rate. Nevertheless, the personal income tax rate is expected

to decrease with Republicans' control over the state Senate. Finally, a state corporate income tax rate is expected to increase if members of the Republican Party control the state Senate.

9) The level of median income induces lower general sales and personal income tax rates, while the number of high-income households stimulates a rise of the personal income tax rate. Finally, as the cost of cross-border shopping increase, higher general sales tax rates can be expected.

6.7. Robustness Checks

The robustness of the baseline results presented in the previous section was tested by employing a couple of alternative model specifications. In addition to the three-stage least-squares method, the time-series, cross-section (TSCS) regression framework was utilized by the current study. More specifically, the two-way fixed effects model allows for the impact of a large number of factors that affect tax shares and tax rates, but are not explicitly included as explanatory variables.[25] In particular, state specific and time effects are introduced to account for the constitutional, statutory, political, social, climatic and geographic differences between the states. The two-way fixed effects versions of equations (13) to (18) include dummy variables for each state with the base state being Alabama. Similarly, to account for changes over the time period, this model includes dummy variables for each year, with the base year being 1979. The choice of Alabama and 1979 as the base state and year is made for simplicity, given that these are the first state and the first year in the sample, respectively. The difference between the two-way

[25] The appropriateness of the fixed-effects model vs. random effects model was tested by obtaining the Hausman *m*-statistic, which tests the null hypothesis of no correlation between the effects variables and the regressors. The test results rejected the null hypothesis and suggest that the fixed-effects model is more appropriate.

fixed effects ordinary least squares and the baseline model is the inclusion of time and state specific effects. However, the two-way fixed effects ordinary least squares does not account for endogeneity between the independent variables but allows for the effect of omitted variables to be considered.

The results obtained from the two-way fixed effects ordinary least squares (TSCS) regression are presented in Table 9.1 for tax share equations and Table 9.2 for tax rate equations. The results suggest very few differences between the baseline and the TSCS results. Most of these variations occur with respect to a state's reliance on the personal income tax. The TSCS results suggest a higher reliance on personal income taxes if the mining sector becomes more dominant. On the other hand, the manufacturing and transportation sectors are no longer significant determinants of a state's reliance on the personal income tax. State expenditures per capita and the level of neighboring states' reliance on the personal income tax do not play a significant role in determining the level of personal income tax share. With regard to the corporate income tax share, the results from the TSCS analysis suggest that as state per capita personal income goes up by $100, a state reduces its reliance on the corporate income tax by 0.23 percent.

A comprehensive specification of state tax rates presented in the baseline model is further enhanced in TSCS framework (Table 9.2). The results from this framework differ from the baseline model in several aspects. First, the interdependence between the general sales and corporate income tax rates cannot be supported by these new results. Furthermore, a new interdependence between the income taxes emerges. A one percent increase in the corporate income tax rate enhances lower personal income tax rates by 0.192 percent, while a one percent increase in the personal income tax rate lowers the

corporate income tax rate by 0.023 percent. With regard to the importance of the border market, the home state border income is no longer an important determinant of the level of a state's general sales tax rate. Conversely, the new results suggest that the home state border income is a significant determinant of the personal income tax rate. Finally, the new results suggest that a state's pervious reliance on the corporate income taxes is not important for the level of its respective tax rate. However, an increase in the neighboring states' highest corporate income tax rate by one-percent will lower the home state corporate income tax rate by 0.061 percent.

In summary, the results from the TSCS analysis suggest that if time period and state-specific effects are added to the model, the results vary slightly from the baseline model. Most of these variations occur in the personal income tax share and the corporate income tax rate equations, suggesting that these two specifications might be somewhat responsive to state- and time-specific effects.

An additional test for omitted variable bias was performed in the current study. Given that the two-way fixed effects ordinary least squares (TSCS) analysis does not control for endogeneity, three-stage least-squares with time and state fixed effects (3SLS w/ TSCS) was employed as well. The obtained results are presented in Table 10.1 for the tax shares equations and Table 10.2 for the tax rate equations. The major difference between the baseline model and the three-stage least-squares with time and state specific variables is in the explanatory power of the independent variables. The results from the three-stage least-squares with time and state specific variables suggest robust statistical significance of explanatory variables. However, in terms of direction of effects, the new results suggest lower reliance on the personal income tax as mining and trade sectors

become more dominant. In particular, a one percent increase in employment of these two sectors will stimulate lower reliance on the personal income tax by 0.77 percent (mining) and 0.12 percent (trade). Another interesting finding suggests lower reliance on corporate income tax as its own tax rate increases. More precisely, as the corporate income tax rate increases by one percent, a 0.407 percent decline in a state's reliance on the corporate income tax can be expected. With regard to the results obtained from the tax rate equations (Table 10.2), the new results suggest that if the members of the Republican Party control state House, lower general sales tax rate can be expected. Similarly, new results suggest no significant interdependence between the two income tax rates. Furthermore, a state's previous reliance on the corporate income tax is not significant determinant of the corporate income tax rate. Overall, the results obtained from the three-stage least-squares analysis with time and state specific variables are much closer to the baseline results than the ones obtained from the TSCS model. The fact that the TSCS analysis did not control for the endogeneity of some independent variables can be a reason for such results. It appears that more appropriate robustness test for the omitted variables is the three-stage least-squares analysis with time and state specific variables included.

Besides the issue of the omitted variables (TSCS specification), the question of sample construction arises as well. Therefore, a second check of the robustness of the baseline 3SLS model was employed. In particular, the same 3SLS method is employed, but now only for a subset of states. This subset includes only the states where all three taxes are present and make a significant contribution to the states' tax revenues. Twelve states are excluded from this sub-sample and these states are: Alaska, Delaware, Florida,

Montana, Nevada, New Hampshire, Oregon, South Dakota, Tennessee, Texas, Washington and Wyoming.

The 3SLS results for the subset of states are presented in Table 11 for tax share equations and Table 12 for tax rate equations. The results obtained for this new subset of states show the variations in reliance on three taxes with respect to a state's industrial mix. More precisely, the reliance on the general sales taxes is no longer influenced by the dominance of the manufacturing sector. However, the new results suggest that predominantly agricultural states rely less on the general sales tax. Furthermore, the reliance on the personal income tax is no longer affected by the dominance of the construction, manufacturing, transportation or finance sectors. Similarly, the mining, trade or finance sectors do not determine state reliance on the corporate income tax.

With regard to other determinants of the tax revenue portfolios, the 3SLS results obtained for the subset of states suggest that home state expenditures per capita, the neighboring states' highest personal income tax share, own general sales and personal income tax rates are no longer important determinants of state tax revenue mixes.

The majority of variations between the results obtained for the subset of states and the baseline results occur in the tax rate equations. For instance, the interdependence between the income taxes obtained by the TSCS analysis is also present for the 3SLS subset analysis but not for the baseline. In addition, new interdependence between the general sales and personal income tax rates is detected by the 3SLS subset analysis. Particularly, a one percent rise in the personal income tax rate is suggested to stimulate a rise in the general sales tax rate by 0.009 percent. In the case of a one percent rise in the general sales tax rate, a 1.62 percent rise in the personal income tax rate is expected.

Finally, in comparison to the baseline results, different kind of interdependence between the general sales and corporate income tax rates is detected by the 3SLS subset analysis. The baseline results suggested a same-direction movement between the two taxes. However, this result does not hold anymore given that the new results suggest a negative interdependence between the general sales and corporate income tax rates.

Furthermore, the differences between the baseline and 3SLS subset results are detected with regard to the importance of the border market and policymakers' party membership. Neighboring states' border population is not an important determinant for the general sales and corporate income taxes, while their income has a negative effect on the level of home state general sales tax rate. With regard to the Political Party membership of the state House and Senate members, the 3SLS subset results suggest that as these two offices are controlled by the Republican Party, higher general sales tax rates can be expected. On the other hand, the party membership of the state Senate has no significant effect on the level of the income taxes. Similarly, the Governor's party affiliation is no longer an important determinant of the state personal income tax rate. Finally, the 3SLS subset results suggest that the Republican Party control of all three offices has no significant effect on the level of the general sales tax rate.

Other differences between the baseline and the 3SLS subset results are also detected by the current study. Particularly, the level of state median income and the number of high-income households are no longer important for the level of the personal income tax rates. Also, the 3SLS subset results suggest that as the neighboring states' level of per capita expenditure goes up, lower corporate income tax rates can be expected.

In summary, the results from the 3SLS subset analysis suggest that the exclusion of those states whose reliance on the three taxes is not significant do change some of the baseline results. More precisely, forty-eight percent of the explanatory variables are no longer significant with this new specification. Therefore, the second check of robustness suggests differences between the baseline and the robustness tests associated with the sample construction. Even though some of the states do not impose the general sales tax or the two income taxes, their exclusion from the sample does not reflect the true preferences of their voters. In this particular case, the zero reliance on a particular tax is a meaningful and important value as it reflects the tax revenue portfolio chosen by a given state. Thus, the fact that many of the results obtained from the subset of states are not robust, does not necessarily reflect sample construction problems but rather the fact that sample size was significantly reduced and some meaningful values have been omitted.

With regard to the tax competition effects, this study tested different specifications of tax competition among geographic neighbors. The approach was to employ the average general sales, personal income and corporate income tax shares and their average tax rates (Table 13 & 14). The empirical results suggest interstate tax competition among geographic neighbors to be based on the average reliance on the personal income taxes. In addition, the lowest general sales and the lowest personal and corporate income tax shares, as well as their respective tax rates, are utilized to test the presence of interstate tax competition (Table 15 & 16). The tax competition based on the lowest general sales tax is determined by the results, which supports the findings from the baseline model. However, no tax competition is determined between the neighbors with

the lowest income taxes and the home state. Similarly, the highest general sales and the highest income tax shares, as well as their respective tax rates, were employed in order to show the presence of tax competition (Table 17 & 18). The empirical results did not support competition based on the highest general sales or corporate income tax shares or their rates. However, the results do suggest that the neighbors' highest reliance on the personal income tax has a significant effect on state tax revenue portfolio. This finding is in line with the baseline results presented in Table 7.

Besides the tests of importance of interstate tax competition, additional robustness tests are performed. In particular, the importance of policymakers' political party affiliation is tested by combining the HRep and SRep variables. The new variable, HSRep, identifies whether or not the Republican Party has control of the state House and Senate. The obtained results suggest lower general sales tax rate if the Republican Party controls a state legislature. This finding is not consistent with traditional view that conservatives are more likely to impose regressive taxes. These results are presented in Table 19 and Table 20.

Chapter 7

Conclusion

Existing literature on tax revenue composition is very limited and primarily devoted to developing countries. This study extends the existing body of literature by focusing on the fifty United States. In particular, it offers explanation of the variations in the tax revenue mix and provides evidence that unifies the different political, economic and tax competition experiences of all fifty states. By specifically modeling three different sources of state tax revenue, the forces that shape state tax revenue portfolios are highlighted. The empirical results provide evidence that political factors, the production mix and tax competition determine the composition of state tax revenue. Given budget shortfalls and fiscal stresses on state governments today, many states need additional revenues to seal budget gaps. States' revenue proposals range from using rainy-day funds to raising taxes and fees. This study gives an analysis of the state tax revenue portfolios and disintegrates the influences of three main determinants of state tax revenues. The role of these determinants can provide important insight to policymakers when considering their state's tax revenue mixes. The results in this study present the ways of reversing the decline in the revenue productivity. Policymakers can achieve this by diversifying state tax revenue portfolios and looking closely at the political factors, state production mix and tax competition aspects of tax revenue composition.

The current study develops a model of tax revenue composition based on a political economy framework developed by Hettich and Winer (1988). The empirical

evidence in this study supports the hypothesis that political costs are significant in determining state tax revenue mixes. Specifically, the results indicate higher political costs for choosing higher general sales and corporate income taxes relative to personal income taxes. In addition, a low political cost for choosing higher general sales tax relative to corporate income tax is suggested by this study.

The hypothesis that a state's industrial mix matters received solid empirical support as well. The results indicate that reliance on a general sales tax is greater in states where the mining and manufacturing sectors are more dominant and less important in transportation-oriented states. However, the reliance on the personal income tax is more important in states where the agricultural, construction and mining sectors are predominant and less important in those states whose production mix is lead by the finance and manufacturing sectors. Finally, the corporate income tax is more important in states where the finance and mining sectors are more dominant and less important in trade and mining states. Therefore, this study provides evidence that production mix marks impact upon the revenue policies of the states. The results suggest different effects of different industries on state tax revenue mix. This implies that dominance by a particular sector can be an instrument in propelling tax revenue growth.

The current study also contributes to the existing literature by considering tax competition in a rational choice framework. Prior studies failed to control for the effects that interstate tax competition has on tax revenue composition. Here a unique approach to tax competition is offered, hypothesizing that government officials compete with their neighbors for two reasons: they wish to remain in office, and they wish to increase their state's tax domain. The empirical results suggest that states try to undercut the

neighboring states with the lowest reliance on the general sales tax and try to follow the ones with the highest reliance on the personal income tax. However, similar conclusions about interstate tax competition based on tax rates could not be reached.

The study also finds that general sales tax is more important for more populated states. On the other hand, the states with higher spending were found to rely less on all three tax sources. Similarly, evidence of interdependence among own tax rates and the importance of border markets is presented. Likewise, the influence of political party membership of state legislators on the level of state tax rates received solid empirical support.

This study takes an initial step toward filling a lack of comprehensive characterization of the tax revenue composition of the fifty states. In addition to the above contributions, the present study is characterized by some limitations as well. The major limitation is the inability to model all components of tax revenue portfolios. The framework developed by this study does not consider other components of state tax revenue composition; e.g., components other than general sales, personal income and corporate income taxes. Since the three tax shares do not sum to one, the analysis does not provide the entire picture of a tax revenue portfolio and its determinants, but the current framework is capable of being extended to deal with other tax sources.

Another limitation is the inability to model all relevant determinants of tax revenue composition. Besides political costs of collecting taxes, this study does not consider other costs of collecting tax revenue – administrative and compliance costs. Equity in a tax system is also not considered. An analysis that is more comprehensive would consider specific elements of each tax structure such as tax bases and exemptions.

Additional research is certainly needed to completely understand the factors that influence state tax revenue portfolios.

The goal of this study was to present researchers and state policymakers with an analysis of a state's reliance on the three primary taxes. The empirical results uncover unique responses of tax portfolios to economic, political and tax competition developments. These three aspects of tax revenue portfolios affect the balance of state tax revenue and produce widespread state budget shortfalls. Therefore, state policymakers can utilize the findings of this study when analyzing their tax revenue compositions. State policymakers could stop the decline in revenue productivity if they look closely at the shifts in their industrial mixes and the political and tax competition aspects of their tax decisions. Therefore, the current study can serve in finding a better solution to states' budget problems. In particular, the results should help evaluate the reliance on particular tax source and develop new tactics that enable policymakers to meet their budget needs.

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Appendices

Appendix 1

Table 1.
Individual Tax Shares for the United States during the 1979, 1989 and 1999*

State	1999			1989			1979		
	PIT	GST	CIT	PIT	GST	CIT	PIT	GST	CIT
Alabama	31.60	27.30	3.90	29.03	26.82	5.89	20.77	31.32	5.76
Alaska	0.00	0.00	23.40	0.02	0.00	32.61	14.21	0.00	31.47
Arizona	27.80	43.90	7.20	22.49	45.36	4.93	17.83	46.46	5.89
Arkansas	31.10	34.80	4.60	31.39	36.70	5.14	22.99	34.78	8.41
California	42.50	31.30	7.50	38.37	30.89	12.28	29.10	34.61	14.52
Colorado	46.90	28.50	5.00	43.83	25.86	5.89	31.72	35.75	7.79
Connecticut	37.50	33.40	4.90	9.37	43.00	16.64	4.86	42.84	13.45
Delaware	38.00	0.00	11.50	37.82	0.00	13.75	43.88	0.00	10.18
Florida	0.00	58.30	5.30	0.00	61.32	5.82	0.00	45.37	7.33
Georgia	45.70	34.90	6.40	43.04	31.92	8.27	29.79	36.50	9.24
Hawaii	33.80	45.70	1.70	34.64	46.23	3.97	30.20	49.15	4.55
Idaho	39.00	32.30	4.40	34.29	34.29	7.08	30.74	27.85	8.42
Illinois	34.20	28.00	9.90	29.85	33.16	9.12	27.57	34.72	7.74
Indiana	38.00	34.00	10.20	32.95	43.72	4.78	22.24	49.10	4.75
Iowa	35.20	33.80	4.80	37.13	29.50	6.42	35.61	25.85	8.29
Kansas	37.00	36.70	5.50	33.82	32.30	7.94	25.08	33.60	11.88
Kentycky	34.40	28.40	4.20	27.53	25.88	7.70	21.98	28.87	7.87
Louisiana	25.50	37.60	4.70	17.05	32.91	8.68	10.75	30.20	9.56
Maine	40.10	32.60	5.80	35.92	32.51	6.06	20.30	35.68	7.44
Maryland	44.10	24.30	4.30	42.85	24.32	5.34	37.99	26.41	5.50
Massachusetts	54.60	22.20	8.50	47.26	22.97	13.11	45.11	19.86	13.36
Michigan	31.70	35.60	10.10	34.06	28.12	16.74	32.30	28.29	16.48
Minnesota	42.50	27.30	6.20	39.02	27.76	7.62	40.08	19.40	11.38
Mississippi	21.50	48.80	5.00	17.36	45.03	6.18	16.17	50.42	4.87
Missouri	42.40	31.70	3.20	36.03	37.68	5.19	26.58	38.89	6.46
Montana	35.40	0.00	6.60	36.48	0.00	7.71	35.35	0.00	9.01
Nebraska	40.30	32.10	5.10	27.68	33.85	9.85	28.09	34.01	6.73
Nevada	0.00	53.30	0.00	0.00	52.16	0.00	0.00	37.98	0.00
New Hampshire	5.90	0.00	23.90	5.91	0.00	24.79	3.49	0.00	24.24
New Jersey	37.40	29.90	7.90	27.58	30.05	12.47	23.28	29.45	11.53
New Mexico	23.20	41.70	4.70	18.47	42.35	4.05	8.11	43.75	4.79
New York	53.20	20.60	7.50	52.09	21.63	7.56	43.48	22.25	10.51
North Carolina	45.60	23.20	6.40	41.13	23.09	10.71	34.18	22.24	8.74
North Dakota	16.40	30.10	8.50	15.87	33.31	6.38	15.15	33.56	8.89
Ohio	39.60	32.30	4.10	35.23	31.67	6.75	18.79	30.89	10.93
Oklahoma	38.20	25.40	3.50	28.16	23.48	3.41	22.04	18.45	6.23
Oregon	69.40	0.00	6.10	66.71	0.00	6.10	58.28	0.00	11.99
Pennsylvania	29.70	30.80	7.10	24.22	32.35	9.26	22.89	27.95	12.59
Rhode Island	40.20	29.60	3.50	9.10	34.03	3.66	28.54	29.41	10.39
South Carolina	34.10	40.30	4.00	33.58	36.31	5.93	27.30	34.53	9.20
South Dakota	0.00	53.20	5.90	0.00	49.87	5.66	0.00	53.16	1.18
Tennessee	2.20	58.60	7.90	2.35	55.01	9.14	1.41	51.12	10.09
Texas	0.00	51.00	0.00	0.00	49.71	0.00	0.00	38.08	0.00
Utah	40.10	37.80	4.90	29.20	41.71	6.20	32.52	41.74	4.73
Vermont	37.90	20.30	4.90	33.63	20.95	6.04	31.17	14.30	8.93
Virginia	52.70	20.70	3.60	46.93	19.48	5.25	37.70	20.86	7.65
Washinton	0.00	58.80	0.00	0.00	60.13	0.00	0.00	56.09	0.00
West Virginia	29.20	28.50	8.40	24.44	30.25	10.79	18.90	48.91	2.23
Wisconsin	44.40	28.10	5.80	7.29	29.47	3.22	42.18	25.14	10.04
Wyoming	0.00	42.80	0.00	0.00	26.21	0.00	0.00	41.22	0.00
United States	**34.50**	**33.20**	**6.10**	**31.23**	**32.89**	**8.40**	**26.11**	**31.61**	**9.70**

- PIT, GST and CIT represent personal income tax, general sales tax and corporate income tax shares. The tax shares are calculated as shares of total revenues that were raised by the three taxes for 1979, 1989 and 1999.

Table 2.
Variable Definitions for Tax Share Equations

Matrix	Variables	Description
Tax Share	*GST, PIT, CIT*	Three tax shares are identified for this category -- general sales tax share, personal income tax and corporate income tax share.
Political Costs	*Political Cost GST/PIT* *Political Cost GST/CIT* *Political Cost PIT/GST* *Political Cost PIT/CIT* *Political Cost CIT/GST* *Political Cost CIT/PIT*	*Political costs for GST are the ratios of retail and service sales to state income *(Political Cost GST/PIT)* and to corporate income *(Political Cost GST/CIT)*; *Political costs for PIT are the ratios of state personal income to the retail and service sales *(Political Cost PIT/GST)* and to corporate income *(Political Cost PIT/CIT)*; *Political costs for CIT are the ratios of corporate income to the retail and service sales *(Political Cost CIT/GST)* and to state personal income *(Political Cost CIT/PIT)*.
Economic Characteristics	*Farm* *Mining* *Construction* *Manufacturing* *Trade* *Transportation* *Finance* *Income PC* *Population* *Expenditure PC* *Prime Age*	**Farm, Mining, Construction, Manufacturing, Trade, Transportation and Finance* are the shares of particular industry employment in state *i*. **Income PC* is personal income per capita in state *i*. **Population* represents the population of state *i*. **Expenditure PC* is lagged state per capita expenditure. **Prime Age* is the percentage of state population that is prime working age.
Tax Competition	*Neigh. Min GST* *GST Rate* *Neigh. Max PIT* *PIT Rate* *Neigh. Max CIT* *CIT Rate*	*For GST matrix contains *Neigh. Min GST* (the lowest GST share of state's geographic neighbors lagged by one year) and *GST Rate* (home state statutory GST Rate); *For PIT matrix contains *Neigh. Max PIT* (the highest PIT tax share of state's geographic neighbors lagged by one year) and *PIT Rate* (home state effective personal income tax rate calculated as a ratio of personal income tax revenue and state's adjusted gross income); * For CIT matrix contains *Neigh. Max CIT* (the highest CIT share of geographic neighbors lagged by one year) and *CIT Rate* (the highest statutory CIT rate in the home state).

Table 3.

Variable Definitions for Tax Rate Equations

Matrix	Variable	Description
Tax Rate	*GST Rate, PIT Rate, CIT Rate*	GST *Rate, PIT Rate and CIT Rate* variables for each tax source in question. These home state tax rates are defined as described in Table 2
HomeTax Rates	*GST Rate, PIT Rate, CIT Rate*	* *Home Tax Rates* = [*Tax Rate*$_h$] is the 1050 x 2 matrix composed of the observations on tax rates other than *j*.
Tax Share	*GST Lag, PIT Lag CIT Lag*	* Lagged GST share (*GST Lag*) for GST Rate equation; * Lagged PIT share (*PIT Lag*) for PIT Rate equation; * Lagged CIT share (*CIT Lag*) for CIT Rate equation.
Border Market	*Home Border Pop* *Neigh. Border Pop* *Home Border Income* *Neigh. Border Income*	* *Home Border Pop* = percentage of home state population that reside in the bordering counties; * *Neigh. Border Pop* = percentage of neighbors' population that reside in counties that border home state; * *Home Border Income* = percentage of home state income earned in bordering counties; * *Neigh. Border Income* = percentage of neighbors' income earned in bordering counties.
Political Party	*HRep* *SRep* *GRep* *SHG*	* *HRep* = Republican Party controls House of Representatives, * *SRep* = Republican Party controls state Senate; * *GRep* = Republican Party controls the governorship; * *SHG* = Republican Party controls all three offices.
Neigh bor	*Neigh. Min GST Rate* *Neigh. Max PIT Rate* *Neigh. Max CIT Rate* *Neigh. ExpenditurePC*	* *Neigh. Min GST Rate* is the lowest *GST Rate* available in the neighboring area (lagged); * *Neigh. Max PIT Rate* is the highest *PIT Rate* available in the neighboring area (lagged); * *Neigh. Max CIT Rate* is the highest *CIT Rate* available in the neighboring area (lagged). * *Neigh. Expenditure PC* is the average government spending of state's neighbors (lagged) used for income rates.
Travel Cost	*Travel Costs*	* *Travel Costs* contains the information on the cost of traveling between the bordering counties of neighboring states for GST Rate.
Income	*Median Income* *HHincome $100K*	* *Median Income* is used in GST & PIT Rate equations. * *HHincome $100K* is the percentage of households that earn $ 100,000 or more (Hhinc100K).

Table 4.
Data Source for Variables

Matrix	Source
Tax Share	* Data for personal income tax share, general sales tax share and corporate income tax shares are obtained from the *State Government Tax Collections 1979-1999, U.S. Department of Commerce, Bureau of the Census.*
Political Costs	* The data for the political costs ratios *(Political Cost GST/PIT, Political Cost GST/CIT, Political Cost PIT/GST, Political Cost PIT/CIT, Political Cost CIT/GST, Political Cost CIT/PIT)* are obtained from the U.S. Bureau of Census, Economic Census.
Economic Characteristics	* The employment data for *Farm, Mining, Construction, Manufacturing, Transportation and Finance* are obtained from the *U.S. Bureau of Labor Statistics.* * The data for *Income PC*, *Population* and *Prime Age* are obtained from *Statistical Abstract of the United States, U.S. Department of Commerce, Bureau of the Census.* * The data for *Expenditure PC* are obtained from *State Government Tax Collections 1979-1999, U.S. Department of Commerce, Bureau of the Census.*
Tax Competition	* The data for *Neigh. Min GST, Neigh. Max PIT, Neigh. Max CIT* and *Neigh. EXPPC* are obtained from *State Government Tax Collections 1979-1999, U.S. Department of Commerce, Bureau of the Census.* * The data for *GST Rate, PIT Rate and CIT Rate* are obtained from *State Tax Handbooks, CCH Incorporated 1979-1999 and the Federation of Tax Administrators data bank.*
Tax Rates	* The data for *Neigh. Min GST Rate, Neigh. Max PIT Rate and Neigh. Max CIT Rate* are obtained from *State Tax Handbooks, CCH Incorporated 1979-1999 and the Federation of Tax Administrators data bank* * The data necessary for calculating the *GST Lag, PIT Lag and CIT Lag* are obtained from *State Government Tax Collections 1979-1999, U.S. Department of Commerce, Bureau of the Census.* * The data for *Home Border Pop, Neigh. Border Pop, Home Border Income and Neigh. Border Income* are obtained form *National Association of Counties data bank and Statistical Abstract of the United States, U.S. Department of Commerce, Bureau of the Census* *The data for *Travel Cost* are obtained from the U.S. Bureau of Census *Master Tax Guide* and Census Bureau, Geography Division * The data for the *Political Party* variables is obtained from the *Political Reference Almanac* from www.PoliSci.Com * The data for the *Income* matrix are obtained from the *Statistical Abstract of the United States,* the U.S. Department of Commerce.

Table 5.
Descriptive Statistics

Variable Name	Mean	Standard Deviation	Minimum	Maximum
GST share	31.324	14.328	0	61.638
PIT share	27.422	15.905	0	69.449
CIT share	6.966	4.614	0	39.324
Political Cost GST/PIT	0.410	0.167	0.132	4.128
Political Cost GST/CIT	699.862	840.145	0	17227.67
Political Cost PIT/GST	2.535	0.578	0.242	7.572
Political Cost PIT/CIT	1678.21	1677.83	0	39463.73
Political Cost CIT/GST	0.0018	0.002	0	0.0353
Political Cost CIT/PIT	0.007	0.0007	0	0.0137
Farm	5.180	4.253	0.320	22.01
Mining	14.355	2.530	0	19.936
Construction	5.576	1.719	0	13.657
Manufacturing	19.952	8.117	3.996	50.387
Trade	27.455	2.325	21.980	42.964
Transportation	6.374	1.570	0.726	14.752
Finance	6.465	1.534	3.923	13.793
Income Per Capita	17588.926	6038.457	6549.299	39542.599
Population	4947751.22	5331325.29	403544	33145121
Expenditure Per Capita	2403.14	1278.48	682.280	6912.120
Prime Age	60.944	2.774	26.020	76.395
Neigh. Min GST	24.291	8.322	0	60.229
Neigh. Max PIT	40.216	13.509	0	69.449
Neigh. Max CIT	9.308	4.332	0	26.975
GST Rate	4.4096	1.7576	0	9.0
PIT Rate	5.357	5.112	0	31.0
CIT Rate	6.5451	2.633	0	12
GST Lag	31.286	14.313	0	61.638
PIT Lag	26.992	15.771	0	68.784
CIT Lag	7.048	4.606	0	39.324
Home Border Pop	40.496	23.3122	0	100.00
Neigh. Border Pop	10.178	8.397	0	38.073
Home Border Income	38.243	24.765	0	100.00
Neigh. Border Income	14.741	14.594	0	62.605
Neigh. Min GST Rate	3.538	1.176	0	6.500
Neigh. Max PIT Rate	10.773	8.427	0	31.00
Neigh. Max CIT Rate	8.158	2.410	0	12.00
Neigh. Expenditure PC	1995.55	985.987	598.854	5621.19
Travel Cost	11.552	6.348	0	39.190
Median Income	38965.35	11720.03	17672.00	75505.00
HH Income >100K	3.638	2.148	0	16.677
House Republican	0.319	0.466	0	1.000
Senate Republican	0.369	0.482	0	1.000
Governor Republican	0.443	0.497	0	1.000
SHG Republican	0.129	0.335	0	1.000

Table 6.1 Correlation Matrix for General Sales Tax Share

	Pol. Cost1	Pol. Cost2	Farm	Mining	Constr ction	Manufa cturing	Trade
Pol. Cost1	1						
Pol. Cost2	0.518 (0.001)	1					
Farm	0.070 (0.022)	0.207 (0.001)	1				
Mining	0.025 (0.342)	-0.067 (0.038)	0.105 (0.001)	1			
Constru ction	0.091 (0.003)	-0.067 (0.032)	-0.165 (0.001)	0.406 (0.001)	1		
Manufa cturing	-0.049 (0.167)	0.088 (0.029)	-0.139 (0.001)	-0.403 (0.001)	-0.262 (0.001)	1	
Trade	0.066 (0.030)	0.173 (0.001)	0.019 (0.517)	0.054 (0.077)	0.174 (0.001)	-0.312 (0.001)	1
Transpo rtat	-0.001 (0.972)	-0.069 (0.203)	0.038 (0.217)	0.511 (0.001)	0.255 (0.001)	-0.447 (0.001)	0.316 (0.001)
Finance	-0.107 (0.070)	-0.039 (0.196)	-0.389 (0.001)	-0.299 (0.001)	-0.116 (0.001)	-0.123 (0.001)	0.214 (0.001)
Populat ion	-0.134 (0.001)	-0.105 (0.006)	-0.315 (0.001)	-0.195 (0.001)	-0.146 (0.001)	0.118 (0.001)	-0.088 (0.004)
Persona Inc.	-0.005 (0.856)	-0.013 (0.669)	-0.042 (0.431)	-0.016 (0.587)	-0.016 (0.582)	0.025 (0.409)	0.012 (0.675)
Prime Age	0.018 (0.546)	-0.009 (0.751)	0.003 (0.915)	0.033 (0.279)	0.005 (0.868)	-0.009 (0.751)	-0.003 (0.901)
Exp PC	-0.030 (0.321)	-0.110 (0.00)	-0.305 (0.001)	0.119 (0.279)	0.027 (0.378)	-0.420 (0.001)	0.061 (0.046)
NMinG STs	-0.004 (0.878)	0.026 (0.455)	0.096 (0.001)	-0.006 (0.774)	0.034 (0.263)	0.077 (0.017)	-0.136 (0.001)
GST Rate	-0.022 (0.469)	-0.063 (0.242)	-0.231 (0.001)	-0.254 (0.001)	-0.185 (0.001)	0.182 (0.001)	-0.106 (0.001)

	Tarans port	Financ e	Populat ion	Prime Age	State Inc	Expend PC	Nmax GSTs	Gst rate
Trans port	1							
Finan ce	0.033 (0.283)	1						
Popul ation	-0.099 (0.001)	0.285 (0.001)	1					
State Inc	-0.011 (0.702)	0.020 (0.497)	-0.002 (0.934)	1				
Prime Age	-0.003 (0.922)	-0.010 (0.742)	0.004 (0.876)	0.007 (0.803)	1			
Exp PC	0.305 (0.001)	0.144 (0.001)	-0.066 (0.025)	-0.052 (0.087)	-0.014 (0.636)	1		
Nmax GSTs	-0.320 (0.001)	-0.149 (0.001)	0.254 (0.001)	-0.003 (0.920)	-0.003 (0.915)	-0.250 (0.001)	1	
GST Rate	-0.450 (0.001)	-0.068 (0.026)	0.202 (0.001)	-0.012 (0.689)	0.012 (0.677)	-0.134 (0.001)	-0.134 (0.001	1

Table 6.2 Correlation Matrix for Personal Income Tax Share

	Political Cost1	Political Cost2	Farm	Mining	Construction	Manufacturing	Trade
Pol Cost1	1						
Pol Cost2	-0.044 (0.145)	1					
Farm	-0.210 (0.001)	0.221 (0.001)	1				
Mining	-0.100 (0.001)	-0.088 (0.001)	0.157 (0.001)	1			
Construction	-0.205 (0.001)	-0.105 (0.001)	-0.160 (0.001)	0.406 (0.001)	1		
Manufact	0.141 (0.001)	-0.064 (0.037)	-0.138 (0.001)	-0.403 (0.001)	-0.262 (0.001)	1	
Trade	-0.138 (0.001)	0.146 (0.001)	0.019 (0.517)	0.060 (0.077)	0.174 (0.001)	-0.351 (0.001)	1
Transportat	-0.064 (0.129)	-0.047 (0.125)	0.038 (0.216)	-0.299 (0.001)	0.255 (0.001)	-0.477 (0.001)	0.322 (0.001)
Finance	0.196 (0.001)	-0.016 (0.588)	-0.389 (0.001)	-0.299 (0.001)	-0.116 (0.001)	-0.123 (0.001)	0.214 (0.001)
Population	0.318 (0.001)	-0.070 (0.021)	-0.315 (0.001)	-0.195 (0.001)	-0.146 (0.001)	0.118 (0.001)	-0.088 (0.004)
SP Inc.	0.028 (0.362)	-0.005 (0.850)	-0.024 (0.431)	-0.016 (0.587)	-0.016 (0.582)	0.025 (0.409)	0.012 (0.675)
Prime Age	-0.017 (0.576)	-0.016 (0.592)	0.003 (0.915)	0.033 (0.279)	0.005 (0.868)	-0.009 (0.751)	-0.003 (0.901)
Expen PC	0.042 (0.167)	-0.124 (0.001)	0.316 (0.001)	0.119 (0.001)	0.027 (0.378)	-0.420 (0.001)	0.061 (0.046)
NMaxPITs	0.056 (0.065)	-0.036 (0.238)	0.035 (0.142)	-0.139 (0.001)	-0.011 (0.702)	0.031 (0.306)	-0.224 (0.001)
PIT Rate	0.084 (0.006)	0.072 (0.018)	-0.078 (0.011)	-0.356 (0.001)	-0.342 (0.001)	0.213 (0.001)	0.011 (0.714)

	Transportatio	Finance	Population	State Inc.	Prime Age	Expend PC	Nmax PITs	PIT Rate
Transportat	1							
Finance	-0.033 (0.283)	1						
Population	-0.099 (0.001)	0.285 (0.001)	1					
SP Inc.	-0.011 (0.702)	0.020 (0.497)	-0.002 (0.934)	1				
Prime Age	-0.003 (0.922)	-0.010 (0.742)	0.004 (0.876)	0.007 (0.803)	1			
Expen PC	0.305 (0.001)	0.144 (0.001)	-0.069 (0.025)	-0.052 (0.087)	-0.014 (0.636)	1		
NMax PITs	-0.449 (0.001)	-0.076 (0.013)	0.178 (0.001)	-0.014 (0.638)	0.030 (0.328)	-0.199 (0.001)	1	
PIT Rate	-0.208 (0.001)	0.216 (0.001)	0.049 (0.114)	-0.005 (0.857)	-0.006 (0.840)	0.055 (0.073)	-0.047 (0.122)	1

Table 6.3 Correlation Matrix for Corporate Income Tax Share

	Political Cost1	Political Cost2	Farm	Mining	Construction	Manufacturing	Trade
Politic Cost1	1						
Political Cost2	-0.044 (0.145)	1					
Farm	-0.210 (0.001)	0.221 (0.001)	1				
Mining	-0.100 (0.001)	-0.088 (0.001)	0.157 (0.001)	1			
Construction	-0.204 (0.001)	-0.105 (0.001)	-0.160 (0.001)	0.406 (0.001)	1		
Manufacturing	0.141 (0.001)	-0.064 (0.037)	-0.138 (0.001)	-0.403 (0.001)	-0.262 (0.001)	1	
Trade	-0.138 (0.001)	0.146 (0.001)	0.019 (0.517)	0.054 (0.077)	0.174 (0.001)	-0.351 (0.001)	1
Transportation	-0.046 (0.129)	-0.037 (0.125)	0.038 (0.216)	0.511 (0.001)	0.255 (0.001)	-0.477 (0.001)	0.384 (0.001)
Finance	0.196 (0.001)	-0.016 (0.588)	-0.040 (0.001)	-0.299 (0.001)	-0.116 (0.001)	-0.123 (0.001)	-0.250 (0.001)
Population	0.318 (0.001)	-0.070 (0.021)	-0.315 (0.001)	-0.195 (0.001)	-0.145 (0.001)	0.118 (0.001)	-0.088 (0.004)
State Inc	0.028 (0.362)	-0.005 (0.850)	-0.024 (0.431)	-0.018 (0.587)	-0.016 (0.582)	0.023 (0.40)	0.013 (0.675)
Prime Age	-0.017 (0.576)	(-0.016 (0.599)	0.003 (0.915)	0.033 (0.279)	0.005 (0.868)	-0.009 (0.751)	-0.003 (0.901)
Exp PC	0.042 (0.167)	-0.126 (0.001)	-0.345 (0.001)	0.119 (0.001)	0.027 (0.378)	-0.420 (0.001)	0.061 (0.046)
NmaxCITshare	0.048 (0.065)	-0.022 (0.471)	-0.118 (0.001)	-0.187 (0.001)	-0.020 (0.510)	0.381 (0.001)	-0.193 (0.001)
CIT Rate	0.051 (0.052)	0.286 (0.001)	-0.029 (0.334)	-0.017 (0.001)	-0.117 (0.001)	-0.188 (0.001)	0.108 (0.001)

	Transportat	Finance	Population	State Inc	Prime Age	Exp PC	Nmax CITs	CIT Rate
Transportat	1							
Finance	0.033 (0.283)	1						
Population	-0.099 (0.001)	0.285 (0.001)	1					
State Inc	-0.011 (0.702)	0.020 (0.497)	-0.002 (0.934)	1				
Prime Age	-0.003 (0.922)	-0.010 (0.742)	0.004 (0.876)	0.007 (0.803)	1			
Exp PC	0.305 (0.001)	0.144 (0.001)	-0.069 (0.025)	-0.052 (0.087)	-0.014 (0.636)	1		
Nmax CITs	-0.514 (0.001)	-0.065 (0.034)	0.000 (0.999)	-0.001 (0.971)	0.009 (0.751)	-0.300 (0.001)	1	
CIT Rate	-0.030 (0.318)	0.092 (0.001)	0.084 (0.006)	0.018 (0.541)	-0.001 (0.971)	0.017 (0.571)	-0.042 (0.165)	1

Table 6.4 Correlation Matrix for General Sales Tax Rate

	PIT Rate	CIT Rate	NeighMinGST	GST Lag	NeighExpPC	Hborder Pop	Nborder Pop
PIT Rate	1						
CIT Rate	0.234 (0.001)	1					
NeighMinGST	-0.044 (0.149)	-0.059 (0.053)	1				
GST Lag	-0.383 (0.001)	-0.238 (0.001)	0.016 (0.587)	1			
NeigExpPC	0.167 (0.001)	-0.073 (0.017)	0.060 (0.049)	-0.029 (0.343)	1		
Hborder Pop	-0.047 (0.123)	-0.228 (0.001)	0.047 (0.123)	-0.187 (0.001)	0.305 (0.001)	1	
Nborder Pop	-0.058 (0.057)	-0.008 (0.771)	0.047 (0.186)	0.011 (0.712)	0.152 (0.001)	0.144 (0.001)	1
Nborder Income	-0.042 (0.062)	0.079 (0.009)	0.0538 (0.081)	-0.001 (0.951)	0.092 (0.002)	0.123 (0.001)	0.663 (0.001)
Hborder Income	-0.036 (0.240)	-0.120 (0.001)	0.043 (0.159)	-0.171 (0.001)	0.265 (0.001)	0.868 (0.001)	0.171 (0.001)
Travel Cost	-0.026 (0.397)	-0.091 (0.003)	-0.059 (0.054)	0.252 (0.001)	0.391 (0.001)	-0.050 (0.098)	-0.0717 (0.020)
Median Income	0.183 (0.001)	-0.031 (0.305)	-0.002 (0.922)	-0.103 (0.001)	0.717 (0.001)	0.037 (0.220)	0.0570 (0.064)
HRep	-0.105 (0.001)	-0.001 (0.959)	-0.008 (0.779)	-0.132 (0.001)	0.198 (0.001)	0.164 (0.001)	-0.018 (0.541)
SRep	-0.201 (0.001)	0.028 (0.356)	0.026 (0.387)	-0.041 (0.178)	0.162 (0.001)	0.045 (0.140)	0.014 (0.627)
GRep	0.041 (0.174)	0.037 (0.218)	0.028 (0.349)	-0.012 (0.674)	0.229 (0.001)	0.073 (0.017)	0.068 (0.026)
SHG	-0.050 (0.102)	0.017 (0.570)	-0.058 (0.057)	0.178 (0.001)	0.178 (0.001)	-0.077 (0.012)	0.016 (0.591)

	Nborder Income	Hborder Income	Travel Cost	Median Income	HRep	SRep	GRep	SHG
Nbord Income	1							
Hborde Income	0.199 (0.001)	1						
Travel Cost	-0.140 (0.001)	-0.073 (0.0169)	1					
Median Income	0.043 (0.160)	0.052 (0.091)	0.163 (0.001)	1				
HRep	-0.136 (0.001)	0.164 (0.001)	0.240 (0.001)	0.113 (0.001)	1			
SRep	-0.144 (0.001)	0.037 (0.220)	0.144 (0.001)	0.115 (0.001)	0.530 (0.001)	1		
GRep	0.001 (0.962)	0.031 (0.310)	0.122 (0.001)	0.125 (0.001)	0.120 (0.001)	0.038 (0.207)	1	
SHG	0.092 (0.002)	-0.065 (0.033)	-0.056 (0.067)	-0.073 (0.017)	-0.048 (0.113)	-0.126 (0.001)	-0.222 (0.001)	1

Table 6.5 Correlation Matrix for Personal Income Tax Rate

	GST Rate	CIT Rate	Neigh MaxPit	NExp PC	PIT Lag	Hborder Pop	Nbord Pop
GST Rate	1						
CIT Rate	-0.101 (0.001)	1					
Neigh MaxPIT	-0.066 (0.031)	-0.114 (0.001)	1				
NExp PC	0.336 (0.001)	-0.073 (0.017)	0.091 (0.003)	1			
PIT Lag	-0.262 (0.001)	0.236 (0.001)	0.021 (0.483)	0.198 (0.001)	1		
Hborder Pop	0.126 (0.001)	-0.228 (0.001)	0.345 (0.001)	0.305 (0.001)	-0.009 (0.748)	1	
Nbord Pop	0.467 (0.001)	-0.008 (0.771)	-0.146 (0.001)	0.152 (0.001)	-0.034 (0.260)	0.144 (0.001)	1
Nbord Income	0.335 (0.001)	0.079 (0.009)	-0.025 (0.402)	0.092 (0.002)	-0.0316 (0.304)	0.123 (0.001)	0.663 (0.001)
Hbord Income	0.097 (0.001)	-0.120 (0.001)	0.430 (0.001)	0.265 (0.001)	-0.022 (0.465)	0.868 (0.001)	0.171 (0.001)
Median Income	0.219 (0.001)	-0.031 (0.305)	-0.024 (0.436)	0.717 (0.001)	0.199 (0.001)	0.037 (0.220)	0.057 (0.064)
HHs 100K	0.043 (0.156)	0.105 (0.001)	0.046 (0.133)	-0.092 (0.002)	0.088 (0.004)	0.008 (0.777)	0.0177 (0.564)
HRep	-0.101 (0.001)	-0.015 (0.959)	0.254 (0.001)	0.198 (0.001)	-0.073 (0.016)	0.164 (0.001)	-0.0188 (0.541)
SRep	0.020 (0.502)	0.028 (0.356)	0.021 (0.001)	0.162 (0.001)	-0.140 (0.001)	0.045 (0.141)	0.014 (0.627)
GRep	0.076 (0.012)	0.038 (0.218)	-0.080 (0.005)	0.229 (0.001)	0.040 (0.191)	0.073 (0.017)	0.068 (0.026)
SHG	0.176 (0.001)	0.017 (0.570)	-0.183 (0.001)	-0.068 (0.027)	-0.069 (0.023)	-0.077 (0.012)	0.016 (0.591)

	Nborde Income	Hborde Income	Median Income	HHs 100K	HRep	SRep	GRep	SHG
Nbord Inc	1							
Hbord Inc	0.199 (0.166)	1						
Median Inc	0.0433 (0.160)	0.052 (0.091)	1					
HHs 100K	0.0680 (0.027)	0.032 (0.294)	0.200 (0.001)	1				
HRep	-0.136 (0.001)	0.164 (0.001)	0.113 (0.001)	-0.131 (0.001)	1			
SRep	-0.144 (0.001)	0.037 (0.220)	0.115 (0.001)	-0.059 (0.052)	0.530 (0.001)	1		
GRep	0.001 (0.962	0.031 (0.310)	0.125 (0.001)	-0.062 (0.041)	0.126 (0.001)	0.038 (0.207)	1	
SHG	0.092 (0.002)	-0.065 (0.033)	-0.073 (0.017)	-0.035 (0.252)	-0.048 (0.113)	-0.126 (0.001)	-0.222 (0.001)	1

Table 6. 6 Correlation Matrix for Corporate Income Tax Rate

	GST Rate	PIT Rate	Neigh MaxCiT	NExp PC	CIT Lag	Hborder Pop	Nborde Pop
GST Rate	1						
PIT Rate	-0.227 (0.001)	1					
Neigh MaxCiT	0.173 (0.001)	0.009 (0.756)	1				
NExp PC	0.336 (0.001)	0.167 (0.001)	0.241 (0.001)	1			
CIT Lag	-0.050 (0.101)	0.014 (0.643)	-0.255 (0.001)	-0.133 (0.001)	1		
Hborder Pop	0.126 (0.001)	-0.047 (0.123)	0.265 (0.001)	0.305 (0.001)	0.017 (0.564)	1	
Nborder Pop	0.467 (0.001)	-0.058 (0.057)	0.101 (0.001)	0.152 (0.001)	0.139 (0.001)	0.144 (0.001)	1
Nborder Income	0.335 (0.001)	-0.057 (0.062)	0.081 (0.008)	0.092 (0.002)	-0.018 (0.544)	0.123 (0.001)	0.663 (0.001)
Hborder Income	0.097 (0.001)	-0.036 (0.240)	0.181 (0.001)	0.265 (0.001)	0.047 (0.124)	0.868 (0.001)	0.171 (0.001)
HRep	-0.101 (0.001)	-0.105 (0.001)	0.075 (0.014)	0.198 (0.001)	0.070 (0.021)	0.164 (0.001)	-0.018 (0.541)
SRep	0.020 (0.502)	-0.201 (0.001)	0.083 (0.007)	0.162 (0.001)	0.091 (0.002)	0.045 (0.140)	0.014 (0.627)
GRep	0.076 (0.012)	0.041 (0.174)	0.155 (0.001)	0.229 (0.001)	0.024 (0.428)	0.073 (0.017)	0.068 (0.026)
SHG	0.176 (0.001)	-0.050 (0.102)	-0.100 (0.001)	-0.068 (0.027)	-0.065 (0.033)	-0.077 (0.012)	0.0166 (0.591)

	Nborder Income	Hborder Income	HRep	SRep	GRep	SHG
Nborder Income	1					
Hborder Income	0.199 (0.001)	1				
HRep	-0.136 (0.001)	0.164 (0.001)	1			
SRep	-0.144 (0.001)	0.037 (0.220)	0.530 (0.001)	1		
GRep	0.0014 (0.962)	0.031 (0.310)	0.126 (0.001)	0.038 (0.207)	1	
SHG	0.092 (0.002)	-0.0656 (0.033)	-0.0488 (0.113)	-0.126 (0.001)	-0.222 (0.001)	1

Table 7.
Three-Stage Least-Squares Regression Results for Tax Shares

Variable	GST (3SLS)	PIT (3SLS)	CIT(3SLS)
Intercept	41.517 (4.90)	19.94 (3.79)	12.95 (2.19)
Political Costs GST/PIT	-3.252*** (0.791)		
Political Costs GST/CIT	0.0009*** (0.00018)		
Political Costs PIT/GST		-0.107 (0.27)	
Political Costs PIT/CIT		-0.001 (0.00008)	
Political Costs CIT/GST			-0.182 (0.178)
Political Costs CIT/PIT			-0.0003*** (0.00006)
Farm	-0.247 (0.15)	0.339** (0.152)	0.101 (0.090)
Mining	0.964*** (0.15)	0.0157 (0.158)	-0.407*** (0.089)
Construction	-0.082 (0.061)	0.601*** (0.142)	0.087 (0.076)
Manufacturing	0.291** (0.13)	-0.2137*** (0.616)	0.046 (0.037)
Transportation	-0.91** (0.292)	0.520** (0.269)	0.384*** (0.162)
Trade	0.005 (0.103)	0.117 (0.105)	-0.309*** (0.064)
Finance	-0.252 (0.226)	-1.40*** (0.22)	0.582*** (0.130)
Population	4.68E-7** (2.08E-7)	-8.29E-7 (2.1E-7)	-1.54E-7 (1.25E-7)
Prime Age	1.582E-8 (3.11E-8)	-7.49E-9 (3.11E-8)	1.75E-8 (1.86E-8)
State Personal Income PC	-0.009 (0.017)	-0.012 (0.017)	-0.0072 (0.01)
Expenditure PC	-0.002*** (0.0005)	-0.001** (0.0004)	-0.002*** (0.0002)
Neighbors' Min GST Share	-0.123*** (0.037)		
Neighbors' Max PIT Share		0.057** (0.028)	
Neighbors' Max CIT Share			-0.041 (0.03)
GST Rate	0.5547** (0.26)		
PIT Rate		0.184*** (0.035)	
CIT Rate			0.47*** (0.11)

The entries are regression coefficients with standard errors in parenthesis.
***, **, * indicates significance at the 0.01, 0.05, 0.10 confidence levels, respectively.

Table 8.
Three-Stage Least-Squares Regression Results for Tax Rates

Variable	GST Rate	PIT Rate	CIT Rate
Intercept	3.49 (0.589)	16.77 (4.12)	2.19 (1.70)
Other Tax Rates 1 (PIT for GST rate and GST for income tax rates)	-0.001 (0.003)	0.197 (0.24)	0.244** (0.113)
Other Tax Rates 2 (CIT rate for GST & PIT rate and PIT for CIT rate)	0.025** (0.01)	0.281** (0.127)	-0.01 (0.01)
Lagged Shares	0.025*** (0.003)	0.349*** (0.026)	-0.052*** (0.018)
Neighbors' Tax Rate (The Lowest for GST rate and the Highest for inc. tax rates)	-0.005 (0.01)	0.039 (0.035)	0.025 (0.03)
Neighbors' Expenditure Per Capita	-0.00004 (0.00004)	0.00002 (0.0003)	-0.0001 (0.00013)
Home Border Population (percent)	-0.028*** (0.011)	-0.161* (0.09)	-0.002 (0.036)
Neighbors' Border Population (percent)	0.027** (0.011)	-0.285** (0.094)	-0.102*** (0.038)
Neighbors' Border Income (percent)	-0.032 (0.023)	-0.013 (0.173)	-0.197*** (0.07)
Home Border Income (percent)	0.031** (0.015)	0.086 (0.11)	0.15*** (0.047)
House Republican (HRep)	-0.02 (0.046)	0.336 (0.371)	0.23 (0.158)
Senate Republican (SRep)	0.012 (0.053)	-1.327*** (0.37)	0.348** (0.156)
Governor Republican (GRep)	-0.073** (0.02)	0.451** (0.227)	0.071 (0.092)
SHG Republican	0.059* (0.033)	0.134 (0.298)	0.101 (0.123)
Median Income	-0.00004*** (6.5E-6)	-0.0002*** (0.00005)	
Households with $ 100,000 or more		0.563*** (0.134)	
Travel Costs	0.029** (0.012)		

The entries are regression coefficients with standard errors in parenthesis.
***, **, * indicates significance at the 0.01, 0.05, 0.10 confidence levels, respectively.

Table 9.1
Time-Series Cross-Section Regression Results for Tax Shares (No Endogeneity Control)

Variable	GST (OLS)	PIT (OLS)	CIT(OLS)
Intercept	20.652 (3.952)	-5.584 (2.481)	15.836 (2.255)
Political Costs GST/PIT	-3.136*** (0.709)		
Political Costs GST/CIT	0.00077*** (0.000161)		
Political Costs PIT/GST		-0.0919 (0.1499)	
Political Costs PIT/CIT		-0.000053 (0.000044)	
Political Costs CIT/GST			0.1098 (0.1461)
Political Costs CIT/PIT			-0.00046*** (0.000043)
Farm	-0.042 (0.135)	0.449*** (0.083)	0.102 (0.817)
Mining	1.027*** (0.133)	0.295*** (0.084)	-0.39*** (0.08)
Construction	-0.077 (0.109)	0.223*** (0.068)	0.077 (0.066)
Manufacturing	0.105** (0.051)	0.031 (0.033)	0.027 (0.032)
Transportation	-0.442* (0.236)	0.155 (0.148)	0.49*** (0.144)
Trade	0.054 (0.092)	-0.052 (0.057)	-0.297*** (0.056)
Finance	0.233 (0.191)	-0.231** (0.120)	0.478*** (0.117)
Population	3.431E-7* (1.853E-7)	-1.06E-7 (1.15E-7)	-1.7E-7 (-1.11E-7)
Prime Age	1.539E-8 (2.774E-8)	8.744E-9 (1.73E-8)	1.419 E-8 (1.685E-8)
State Personal Income PC	0.0011 (0.0156)	-0.00976 (0.00975)	-0.0023*** (0.0002)
Expenditure PC	-0.00079* (0.0004)	-0.007 (0.0005)	-0.0025*** (0.0002)
Neighbors' Min GST Share	-0.0597** (0.0312)		
Neighbors' Max PIT Share		-0.0143 (0.016)	
Neighbors' Max CIT Share			0.0039 (0.039)
GST Rate	3.332*** (0.229)		
PIT Rate		0.761*** (0.0665)	
CIT Rate			0.179*** (0.046)
R^2	.961	.988	.862

The entries are regression coefficients with standard errors in parenthesis. ***, **, * indicates significance at the 0.01, 0.05, 0.10 confidence levels, respectively.

Table 9.2.
Time-Series Cross-Section Regression Results for Tax Rates
(No Endogeneity Control)

Variable	GST Rate	PIT Rate	CIT Rate
Intercept	5.51 (1.19)	7.48 (8.75)	-6.21 (3.34)
Other Tax Rates 1 (PIT for GST rate and GST for income tax rates)	0.005 (0.003)	0.388 (0.244)	0.097 (0.091)
Other Tax Rates 2 (CIT rate for GST & PIT rate and PIT for CIT rate)	0.003 (0.01)	-0.192** (0.082)	-0.023** (0.01)
Lagged Shares	0.046*** (0.004)	0.55*** (0.029)	-0.0003 (0.019)
Neighbors' Tax Rate (The Lowest for GST rate and the Highest for inc. tax rates)	-0.01 (0.01)	0.010 (0.038)	-0.061* (0.036)
Neighbors' Expenditure Per Capita	-0.00005 (0.0004)	0.00007 (0.00039)	-0.0001 (0.00013)
Home Border Population (percent)	-0.027** (0.012)	-0.178* (0.098)	-0.0073 (0.037)
Neighbors' Border Population (percent)	0.036*** (0.012)	-0.42*** (0.1)	-0.079** (0.039)
Neighbors' Border Income (percent)	-0.03 (0.024)	-0.138 (0.186)	-0.174*** (0.07)
Home Border Income (percent)	0.0137 (0.015)	0.262** (0.12)	0.1028** (0.04)
House Republican (HRep)	-0.018 (0.047)	0.308 (0.38)	0.096 (0.146)
Senate Republican (SRep)	0.047 (0.046)	-0.862** (0.37)	0.471*** (0.145)
Governor Republican (GRep)	-0.064** (0.03)	0.548** (0.24)	0.119 (0.095)
SHG Republican	0.072* (0.04)	-0.061 (0.325)	0.087 (0.127)
Median Income	-0.00005*** (6.602E-6)	-0.00024*** (0.00005)	
Households with $ 100,000 or more		0.695*** (0.145)	
Travel Costs	0.029* (0.01)		
R^2	0.951	0.960	0.786

The entries are regression coefficients with standard errors in parenthesis.
***, **, * indicates significance at the 0.01, 0.05, 0.10 confidence levels, respectively.

Table 10.1

Three-Stage Least-Squares Regression Results for Tax Shares with Time and State Fixed Effects

Variable	GST (3SLS w/ TSCS)	PIT (3SLS w/ TSCS)	CIT(3SLS w/ TSCS)
Intercept	36.07 (4.31)	18.99 (3.60)	12.03 (2.08)
Political Costs GST/PIT	-3.27*** (0.75)		
Political Costs GST/CIT	0.0009*** (0.0001)		
Political Costs PIT/GST		-0.182 (0.25)	
Political Costs PIT/CIT		-0.00008 (0.00007)	
Political Costs CIT/GST			-0.114 (0.16)
Political Costs CIT/PIT			-0.0003*** (0.00006)
Farm	-0.225 (0.143)	0.376*** (0.14)	0.093 (0.08)
Mining	0.9*** (0.144)	-0.77** (0.149)	-0.422*** (0.085)
Construction	-0.19 (0.12)	0.53*** (0.13)	0.1 (0.07)
Manufacturing	0.09* (0.05)	-0.172*** (0.05)	0.044 (0.034)
Transportation	-0.677*** (0.27)	0.57** (0.25)	0.409*** (0.156)
Trade	0.059 (0.098)	-0.12* (0.01)	-0.283*** (0.06)
Finance	-0.011 (0.209)	-1.27*** (0.21)	0.523*** (0.124)
Population	4.9E-7*** (1.9E-7)	-7.84E-8 (2.01E-7)	-1.45E-7 (-1.2E-7)
Prime Age	1.84E-8 (2.9E-8)	1.1E-8 (2.9E-8)	1.86 E-8 (1.85E-8)
State Personal Income PC	-0.006 (0.016)	-0.008 (0.00165)	-0.007 (0.0002)
Expenditure PC	-0.001*** (0.0004)	-0.001*** (0.0004)	-0.0025*** (0.01)
Neighbors' Min GST Share	-0.096** (0.034)		
Neighbors' Max PIT Share		-0.053** (0.027)	
Neighbors' Max CIT Share			-0.012 (0.032)
GST Rate	0.626*** (0.25)		
PIT Rate		0.146*** (0.02)	
CIT Rate			-0.407*** (0.09)

The entries are regression coefficients with standard errors in parenthesis. ***, **, * indicates significance at the 0.01, 0.05, 0.10 confidence levels, respectively.

Table 10.2.
Three-Stage Least-Squares Regression Results for Tax Rates with Time and State Fixed Effects

Variable	GST Rate	PIT Rate	CIT Rate
Intercept	2.45 (0.59)	16.54 (4.04)	2.73 (1.7)
Other Tax Rates 1 (PIT for GST rate and GST for income tax rates)	-0.0015 (0.003)	-0.108 (0.233)	0.182* (0.107)
Other Tax Rates 2 (CIT rate for GST & PIT rate and PIT for CIT rate)	0.061*** (0.015)	-0.144 (0.117)	-0.013 (0.011)
Lagged Shares	0.027*** (0.003)	0.35*** (0.025)	-0.045 (0.018)
Neighbors' Tax Rate (The Lowest for GST rate and the Highest for inc. tax rates)	-0.003 (0.011)	0.014 (0.035)	-0.044 (0.036)
Neighbors' Expenditure Per Capita	-0.00005 (0.0004)	0.00006 (0.0003)	-0.0001 (0.0001)
Home Border Population (percent)	-0.044*** (0.01)	-0.184** (0.088)	-0.0003 (0.036)
Neighbors' Border Population (percent)	0.036*** (0.012)	-0.23*** (0.09)	-0.11*** (0.03)
Neighbors' Border Income (percent)	-0.031 (0.024)	-0.012 (0.17)	-0.191*** (0.07)
Home Border Income (percent)	0.029** (0.015)	0.159 (0.11)	0.144** (0.04)
House Republican (HRep)	-0.129** (0.057)	-0.202 (0.39)	0.22 (0.17)
Senate Republican (SRep)	0.007 (0.016)	-0.8** (0.27)	0.41** (0.15)
Governor Republican (GRep)	-0.059** (0.031)	0.48** (0.22)	0.22 (0.09)
SHG Republican	0.076*** (0.04)	-0.051 (0.26)	-0.153 (0.111)
Median Income	-0.00004*** (6.4E-6)	-0.0002*** (0.00004)	
Households with $ 100,000 or more		0.56*** (0.13)	
Travel Costs	0.0432*** (0.012)		

The entries are regression coefficients with standard errors in parenthesis.
***, **, * indicates significance at the 0.01, 0.05, 0.10 confidence levels, respectively.

Table 11.
Three-Stage Least-Squares Regression Results for Tax Shares (Subset of States)

Variable	GST (3SLS)	PIT (3SLS)	CIT(3SLS)
Intercept	35.39 (4.04)	15.69 (3.62)	13.00 (1.43)
Political Costs GST/PIT	-6.235*** (1.02)		
Political Costs GST/CIT	0.002*** (0.0003)		
Political Costs PIT/GST		0.066 (0.27)	
Political Costs PIT/CIT		0.002 (0.0001)	
Political Costs CIT/GST			-0.096 (0.09)
Political Costs CIT/PIT			-0.001*** (0.00006)
Farm	-0.302* (0.17)	0.50*** (0.158)	-0.038 (0.065)
Mining	0.864*** (0.17)	-0.046 (0.195)	-0.085 (0.071)
Construction	-0.11 (0.15)	0.093 (0.145)	0.025 (0.056)
Manufacturing	0.014 (0.064)	-0.027 (0.062)	0.027 (0.025)
Transportation	-0.60** (0.33)	0.37 (0.31)	0.293** (0.129)
Trade	0.147 (0.12)	0.056 (0.111)	-0.027 (0.045)
Finance	-0.184 (0.34)	-0.10 (0.33)	0.091 (0.130)
Population	2.47E-7** (2.15E-7)	-6.76E-7 (2.1E-7)	-2.13E-8 (8.70E-8)
Prime Age	1.052E-8 (3.0E-8)	2.08E-8 (2.82E-8)	2.16E-9 (1.19E-8)
State Personal Income PC	-0.022 (0.017)	-0.016 (0.016)	-0.004 (0.006)
Expenditure PC	-0.0008 (0.0005)	-0.001** (0.0005)	-0.0008*** (0.0002)
Neighbors' Min GST Share	-0.06** (0.031)		
Neighbors' Max PIT Share		0.02 (0.026)	
Neighbors' Max CIT Share			0.008 (0.019)
GST Rate	0.357 (0.487)		
PIT Rate		0.022 (0.045)	
CIT Rate			0.366*** (0.055)

The entries are regression coefficients with standard errors in parenthesis.
***, **, * indicates significance at the 0.01, 0.05, 0.10 confidence levels, respectively.

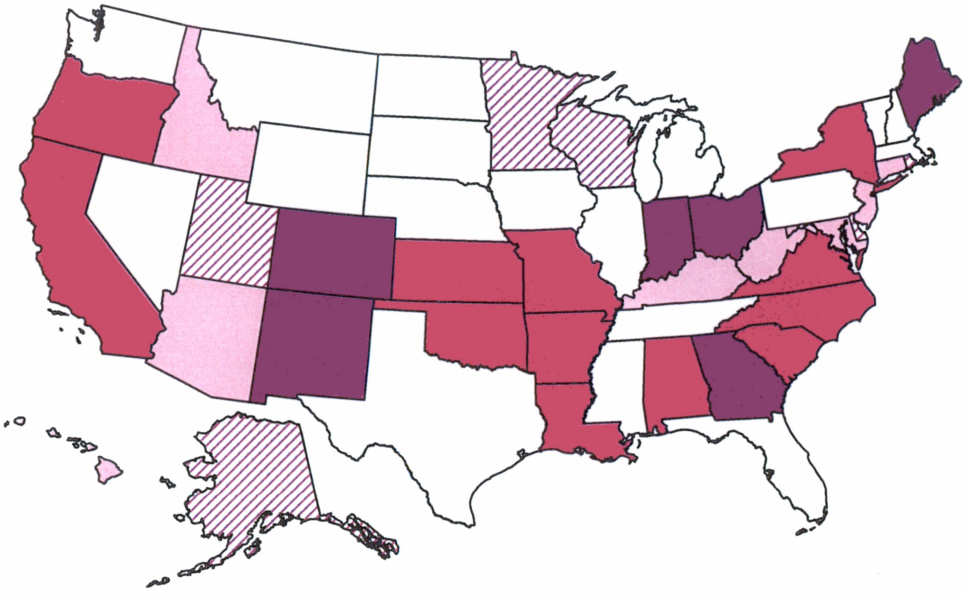
Table 12.
Three-Stage Least-Squares Regression Results for Tax Rates (Subset of States)

Variable	GST Rate	PIT Rate	CIT Rate
Intercept	2.333 (0.743)	17.46 (5.19)	1.615 (2.14)
Other Tax Rates 1 (PIT for GST rate and GST for income tax rates)	0.009** (0.005)	1.622*** (0.51)	-0.393** (0.191)
Other Tax Rates 2 (CIT rate for GST & PIT rate and PIT for CIT rate)	-0.081** (0.017)	-0.453*** (0.139)	-0.076*** (0.01)
Lagged Shares	0.027*** (0.004)	0.143*** (0.028)	-0.031 (0.032)
Neighbors' Tax Rate (The Lowest for GST rate and the Highest for inc. tax rates)	-0.011 (0.01)	0.009 (0.041)	0.045 (0.038)
Neighbors' Expenditure Per Capita	0.00001 (0.00005)	0.0005 (0.0004)	-0.0004*** (0.0001)
Home Border Population (percent)	-0.028** (0.013)	-0.248** (0.102)	-0.016 (0.042)
Neighbors' Border Population (percent)	0.005 (0.012)	-0.321** (0.10)	0.011 (0.04)
Neighbors' Border Income (percent)	-0.096*** (0.024)	0.191 (0.196)	-0.181** (0.07)
Home Border Income (percent)	0.089*** (0.017)	0.204 (0.14)	0.258*** (0.058)
House Republican (HRep)	0.151*** (0.05)	0.485 (0.411)	0.086 (0.17)
Senate Republican (SRep)	0.138** (0.058)	-0.316 (0.37)	0.117 (0.189)
Governor Republican (GRep)	-0.11** (0.03)	0.110 (0.258)	-0.171 (0.110)
SHG Republican	0.018 (0.04)	0.137 (0.349)	0.015 (0.15)
Median Income	-0.00006*** (7.5E-6)	-0.00009 (0.00006)	
Households with $ 100,000 or more		0.202 (0.24)	
Travel Costs	0.042** (0.014)		

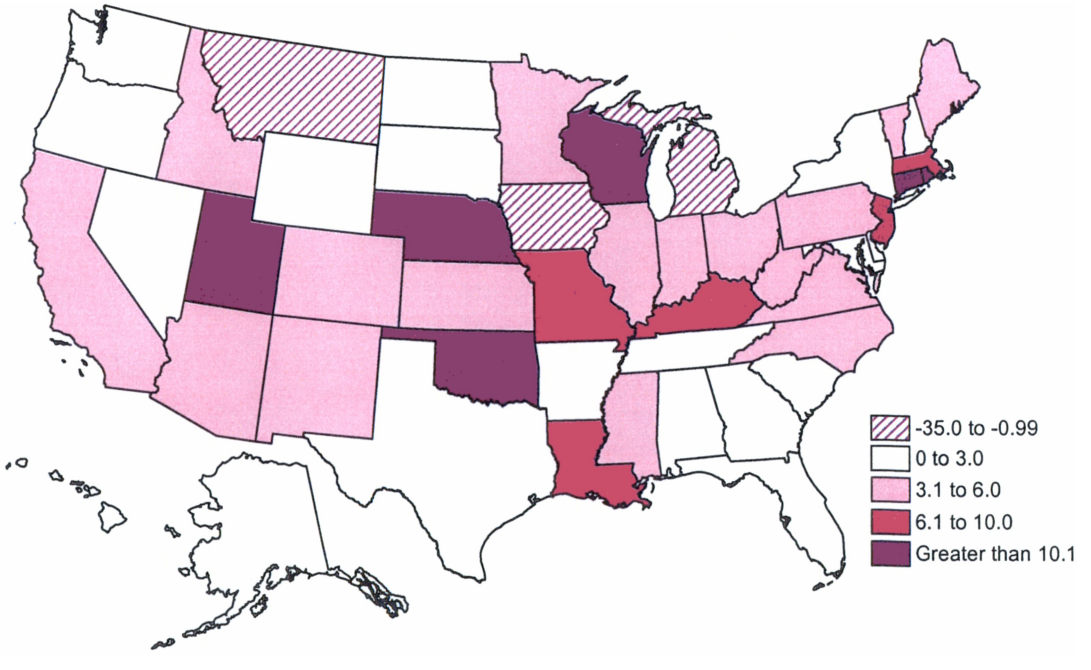
The entries are regression coefficients with standard errors in parenthesis.
***, **, * indicates significance at the 0.01, 0.05, 0.10 confidence levels, respectively.

Appendix 2

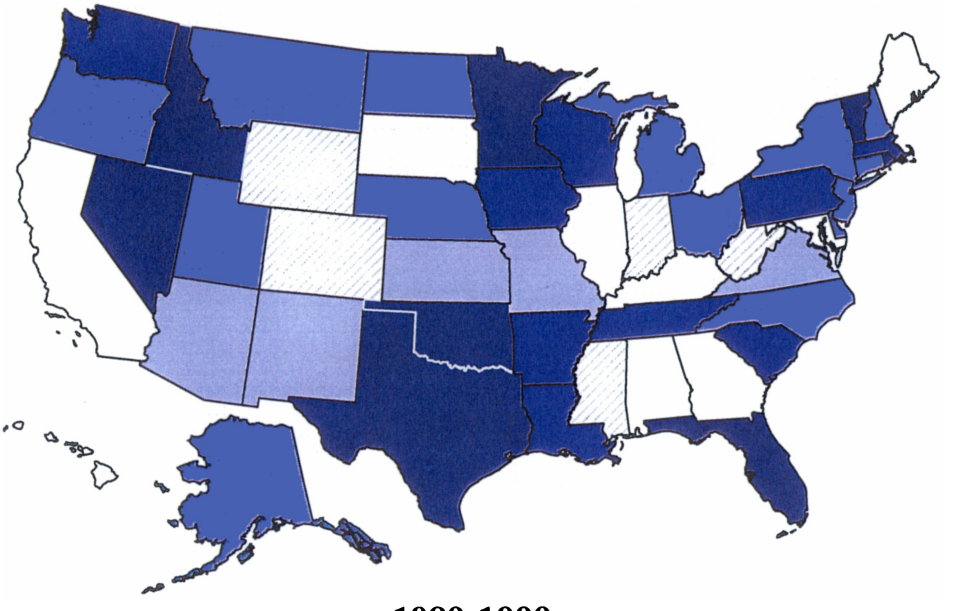
Map 1: Changes in Personal Income Tax Shares
1979-1989



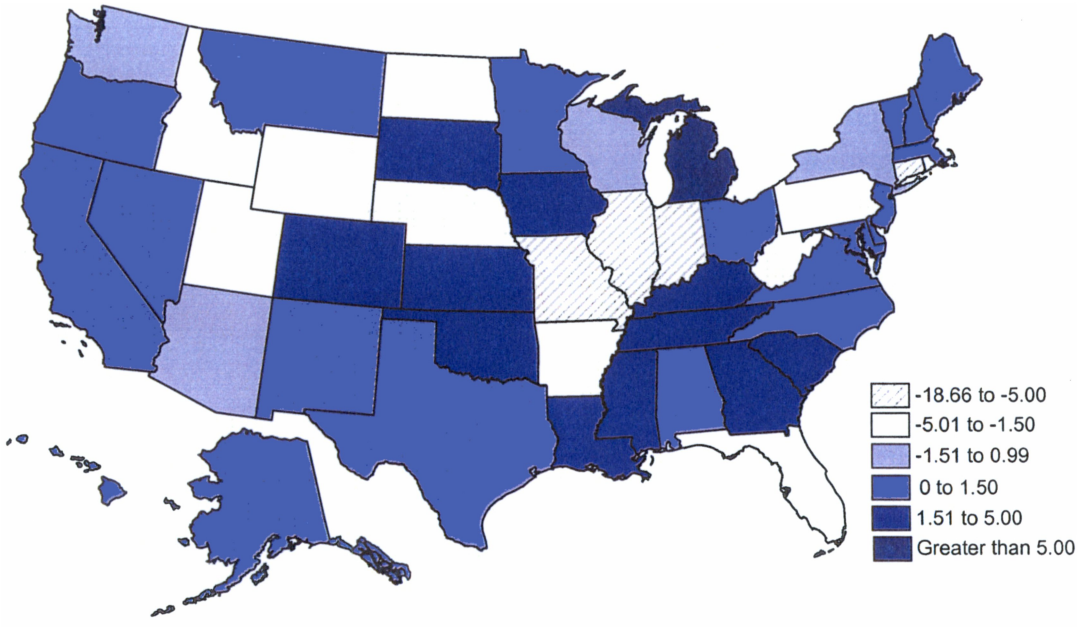
1989-1999



Map 2: Changes in General Sales Tax Shares 1979-1989

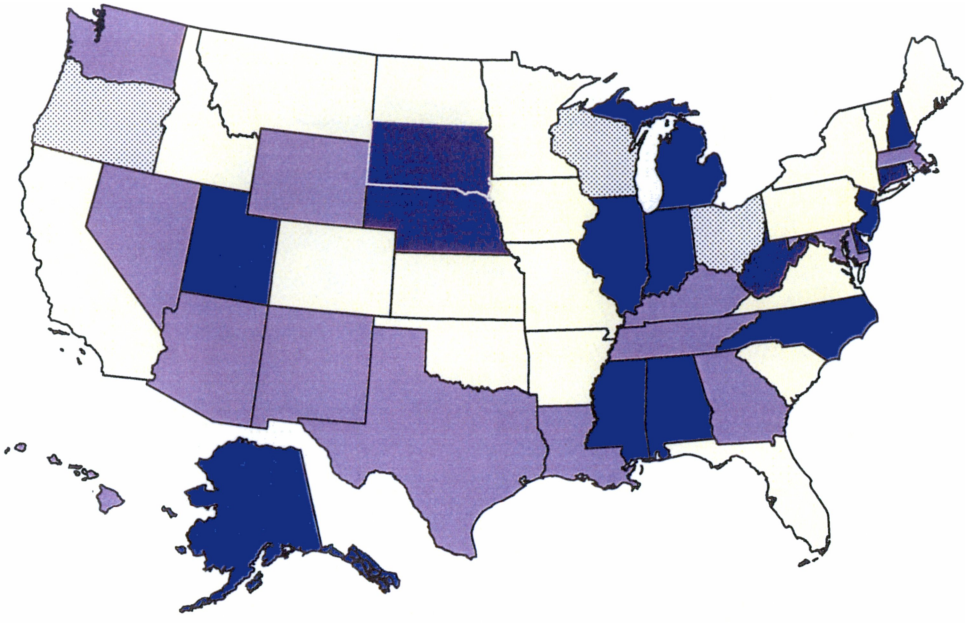


1989-1999

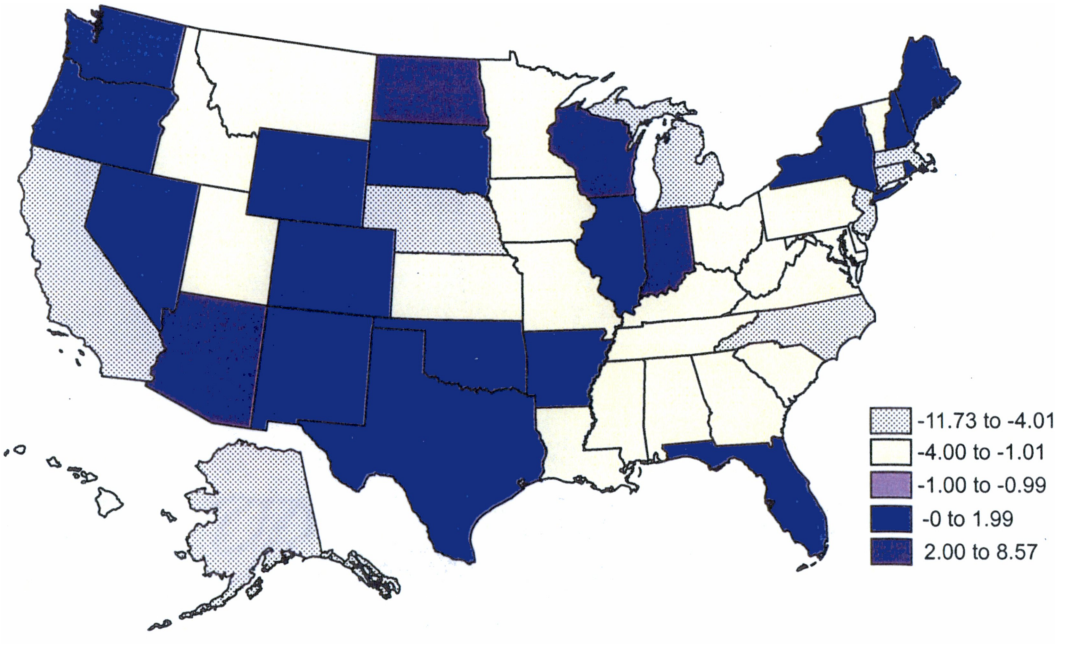


Map 3: Changes in Corporate Income Tax Shares

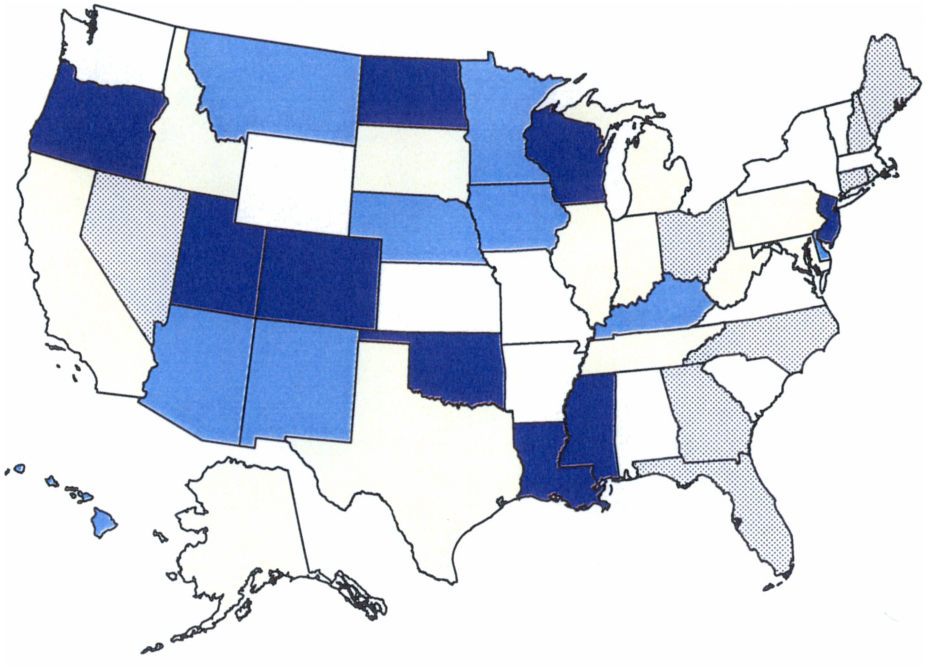
1979-1989



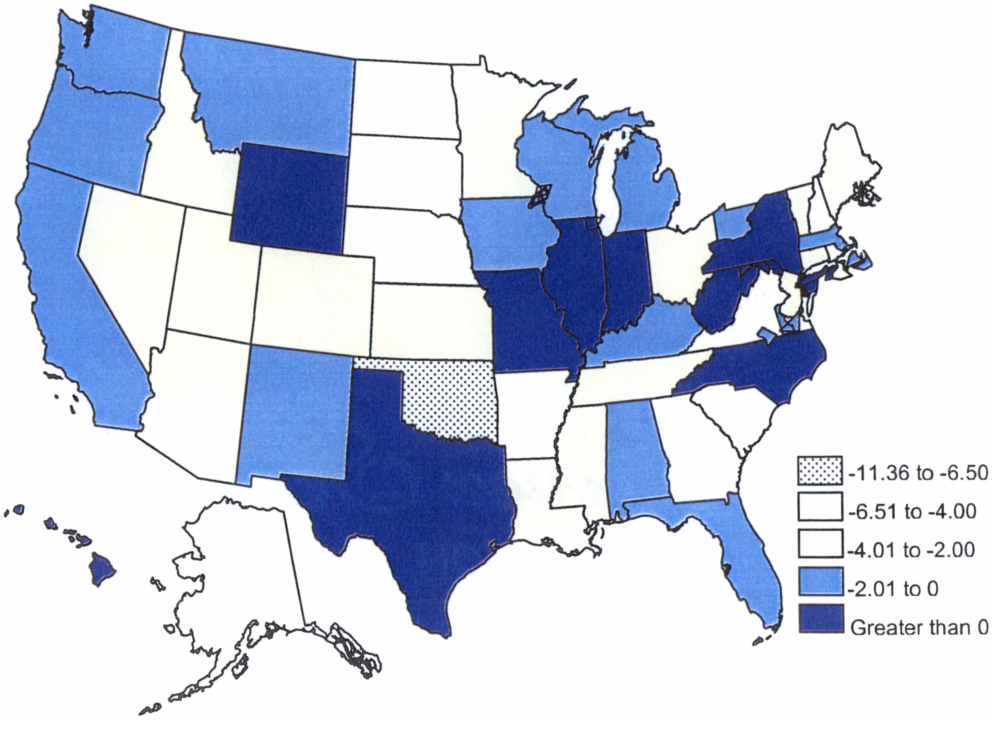
1989-1999



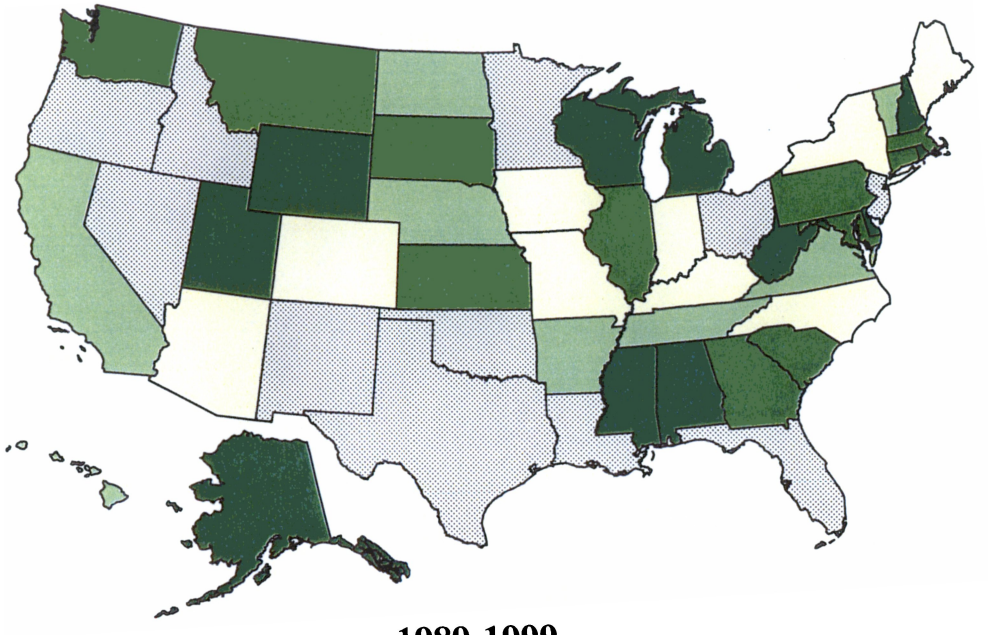
Map 4: Changes in Selective Sales Tax Shares 1979-1989



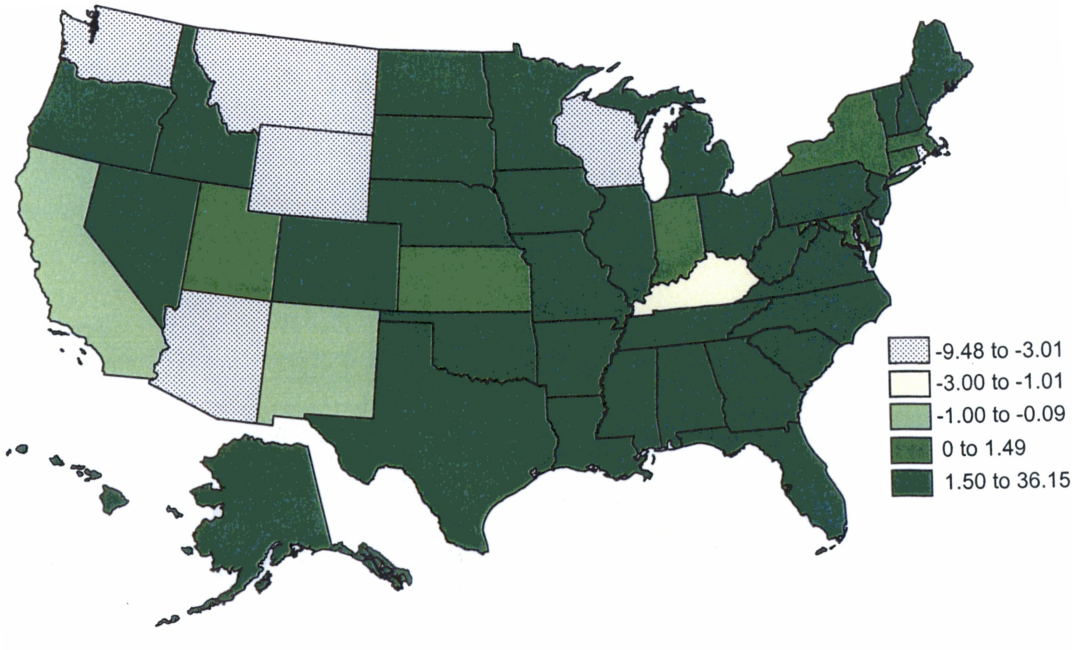
1989-1999



Map 5: Changes in Other Tax Shares 1979-1989



1989-1999



Appendix 3

The Issues of Other Robustness Tests

There are several important issues of the robustness tests that have not been addressed in the main text. These issues concern (i) the choice of a state's competitors and therefore the tax competition effect and (ii) the treatment of the political costs.

i) The choice of a state's competitors and the tax competition effects

There is no agreement in economic literature on the question of who a state's tax competitors are. Most state tax studies choose a selected number of states or "similarly situated states" for comparison purposes. The studies that choose a selected number of states usually include neighboring as well as non-neighboring states that share some similarities with the home state. For instance, for the analysis of Massachusetts' fiscal issues, Munnell and Browne (1990) compared the State of Massachusetts with the following set of states: a) other New England states; b) Illinois, Michigan, New Jersey, New York and Pennsylvania -- a group of industrial states; c) Arizona, California, Maryland, North Carolina, Texas and Washington -- a group of high technology states. Thus, for the comparison purposes, Massachusetts' fiscal structure is compared to seventeen other states that are considered fiscal competitors. Similarly, Ebel's (1990) tax study for Nevada included sixteen competitor states: a) all the neighbors; b) Hawaii and Florida – like Nevada, these two states rely heavily on tourism; c) Texas and South Dakota – like Nevada, these two states do not levy income taxes; d) Alaska -- like Nevada, Alaska raises large amounts of tax revenue from one industry; e) New Jersey – in 1990 New Jersey had a large casino industry; f) all states in the western third of the continental United States.

Given the difficulty in finding a single dimension among the competing states that apply to all states, the majority of state tax studies choose geographic neighbors as their state's competitors. Since this study examines the tax competition for the three tax sources, it would be impossible to come up with varying sets of competitors depending upon the tax source that is under consideration. In addition, given the political economy aspect of tax competition used by the current study, the choice of geographic neighbors allows for a single measure of states that apply to all United States.

ii) Measuring the political costs to policymakers

Many tax analysts have faced the difficulty of measuring the political costs of different taxes (Hettich and Winer, 1984; Landon and Ryan, 1997). Depending on the hypothesis about the nature of political opposition to taxation, three measures of the political costs have been developed by the researchers.

a) Measures that define the political cost as opposition to the government growth (Hettich and Winer, 1999). In this case, the tax revenue composition depends upon the scale of the public sector. Therefore, in order to reflect possible scale effects that may influence fiscal choices, total state expenditures per capita is included in estimating equations.

b) The second approach to measuring the political costs of taxation considers the variability of tax sources. The argument is that if tax sources are more subject to fluctuations, the grater political opposition can be expected. Therefore, policymakers chose to rely more on tax sources with less variability (Voge and Trost, 1979). The measures of this kind of political cost that are used by the

researches consist of the "year-over-year percentage change" in the tax source. The current study utilizes this approach to test the robustness of the political cost variables. The obtained results for the tax shares and tax rates are presented in Table 21 and Table 22, respectively. The obtained results suggest that the variability of the income taxes play an important role in determining the state tax revenue portfolio. In particular, the results suggest lower reliance on the two income taxes as their variability increases.

c) The third approach assumes that the relative importance of a particular tax in tax portfolio depends on the size of alternative potential bases available to the government (Hettich and Winer, 1999). The current study follows this approach and defines the political costs that policymakers face as the ratios of the alternative tax bases. Given that the potential tax base indicates the base gross of exemptions and deductions, an increase in revenue from potential base implies larger burden for those who bear the tax. Furthermore, given the interest of the current study to identify the relative importance of the three taxes in tax revenue portfolio, the third approach of measuring the political costs of taxation has the most interesting implications for the tax revenue portfolios.

Table 13.
Three-Stage Least-Squares Regression Results for Tax Shares (Neighbors' Average Shares)

Variable	GST (3SLS)	PIT (3SLS)	CIT(3SLS)
Intercept	30.59 (4.56)	26.03 (4.23)	9.72 (1.88)
Political Costs GST/PIT	-3.25*** (0.73)		
Political Costs GST/CIT	0.0008*** (0.0001)		
Political Costs PIT/GST		-0.513 (0.322)	
Political Costs PIT/CIT		0.00002 (0.00009)	
Political Costs CIT/GST			0.059 (0.16)
Political Costs CIT/PIT			-0.0004*** (0.00006)
Farm	-0.179 (0.144)	0.45*** (0.18)	0.157 (0.082)
Mining	0.887*** (0.14)	-0.094 (0.18)	-0.37*** (0.083)
Construction	-0.175 (0.123)	0.73*** (0.16)	0.073 (0.067)
Manufacturing	0.026 (0.058)	-0.025*** (0.073)	0.032 (0.033)
Transportation	-0.486 (0.268)	0.49 (0.32)	0.464*** (0.144)
Trade	-0.077 (0.097)	0.59 (0.12)	-0.29*** (0.056)
Finance	-0.535 (0.219)	-1.26*** (0.28)	0.482*** (0.11)
Population	5.04E-7*** (1.9E-7)	-2.31E-7 (2.5E-7)	-1.74E-7 (1.13E-7)
Prime Age	2.12E-8 (2.9E-8)	-1.6E-8 (3.76E-8)	1.39E-8 (1.68E-8)
State Personal Income PC	-0.006 (0.016)	-0.012 (0.02)	-0.005 (0.009)
Expenditure PC	-0.0016*** (0.0004)	-0.0005 (0.0005)	-0.002*** (0.0002)
Neighbors' Average GST Share	-0.0004 (0.007)		
Neighbors' Average PIT Share		0.024** (0.021)	
Neighbors' Average CIT Share			0.015 (0.017)
GST Rate	0.411 (0.312)		
PIT Rate		0.249*** (0.0419)	
CIT Rate			0.009 (0.11)

The entries are regression coefficients with standard errors in parenthesis.
***, **, * indicates significance at the 0.01, 0.05, 0.10 confidence levels, respectively.

Table 14.
Three-Stage Least-Squares Regression Results for Tax Rates
(Neighbors' Average Tax Rates)

Variable	GST Rate	PIT Rate	CIT Rate
Intercept	2.071 (0.622)	12.82 (4.54)	2.487 (1.80)
Other Tax Rates 1 (PIT for GST rate and GST for income tax rates)	0.0065 (0.004)	0.268 (0.34)	0.162 (0.139)
Other Tax Rates 2 (CIT rate for GST & PIT rate and PIT for CIT rate)	0.047*** (0.017)	0.275** (0.132)	0.001 (0.01)
Lagged Shares	0.032*** (0.004)	0.414*** (0.027)	-0.02 (0.021)
Neighbors' Average Tax Rates (Average GST, PIT & CIT rates)	-0.051 (0.05)	0.183 (0.115)	0.043 (0.068)
Neighbors' Expenditure Per Capita	0.00007 (0.00004)	0.0002 (0.0003)	-0.0001 (0.0001)
Home Border Population (percent)	-0.039*** (0.012)	-0.172** (0.09)	-0.013 (0.037)
Neighbors' Border Population (percent)	0.039** (0.01)	-0.341*** (0.09)	-0.09 (0.039)
Neighbors' Border Income (percent)	-0.029 (0.025)	-0.067 (0.18)	-0.185** (0.07)
Home Border Income (percent)	0.037** (0.016)	0.155 (0.12)	0.128*** (0.049)
House Republican (HRep)	-0.033 (0.05)	0.533 (0.402)	0.182 (0.16)
Senate Republican (SRep)	0.021 (0.054)	-1.31*** (0.37)	0.503 (0.156)
Governor Republican (GRep)	-0.068** (0.03)	0.392 (0.23)	0.089 (0.097)
SHG Republican	0.094*** (0.03)	-0.358 (0.298)	-0.125 (0.11)
Median Income	-0.00004*** (6.84E-6)	-0.0002*** (0.00005)	
Households with $ 100,000 or more		0.672*** (0.141)	
Travel Costs	0.045*** (0.013)		

The entries are regression coefficients with standard errors in parenthesis.
***, **, * indicates significance at the 0.01, 0.05, 0.10 confidence levels, respectively.

Table 15.
Three-Stage Least-Squares Regression Results for Tax Shares (Neighbors' Min Tax Shares)

Variable	GST (3SLS)	PIT (3SLS)	CIT(3SLS)
Intercept	33.09 (4.47)	25.62 (3.75)	11.74 (2.02)
Political Costs GST/PIT	-3.21*** (0.73)		
Political Costs GST/CIT	0.0008*** (0.0001)		
Political Costs PIT/GST		-0.608** (0.284)	
Political Costs PIT/CIT		0.00006 (0.00008)	
Political Costs CIT/GST			-0.16 (0.17)
Political Costs CIT/PIT			-0.0003*** (0.00006)
Farm	-0.185 (0.148)	0.41*** (0.16)	0.09 (0.08)
Mining	0.845*** (0.148)	-0.008 (0.16)	-0.43*** (0.086)
Construction	-0.165 (0.123)	0.571*** (0.142)	0.087 (0.017)
Manufacturing	0.098* (0.059)	-0.024*** (0.065)	0.046*** (0.031)
Transportation	-0.495* (0.27)	0.35 (0.28)	0.464*** (0.144)
Trade	-0.068 (0.097)	0.06 (0.11)	-0.30*** (0.06)
Finance	0.016 (0.219)	-1.38*** (0.24)	0.54*** (0.12)
Population	5.01E-7*** (1.96E-7)	-1.68E-7 (2.2E-7)	-1.63E-7 (1.19E-7)
Prime Age	1.52E-8 (2.94E-8)	-3.29E-8 (3.29E-8)	1.62E-8 (1.78E-8)
State Personal Income PC	-0.006 (0.016)	-0.011 (0.018)	0.006 (0.01)
Expenditure PC	-0.0017*** (0.0004)	-0.0005 (0.0005)	-0.002*** (0.0002)
Neighbors' Min GST Share	-0.075** (0.032)		
Neighbors' Min PIT Share		0.001 (0.003)	
Neighbors' Min CIT Share			-0.047 (0.034)
GST Rate	0.43 (0.281)		
PIT Rate		0.215*** (0.038)	
CIT Rate			0.335** (0.109)

The entries are regression coefficients with standard errors in parenthesis.
***, **, * indicates significance at the 0.01, 0.05, 0.10 confidence levels, respectively.

Table 16.
Three-Stage Least-Squares Regression Results for Tax Rates
(Neighbors' Min Tax Rates)

Variable	GST Rate	PIT Rate	CIT Rate
Intercept	2.21 (0.627)	14.83 (4.33)	2.141 (1.69)
Other Tax Rates 1 (PIT for GST rate and GST for income tax rates)	0.010** (0.004)	0.376 (0.29)	0.167 (0.12)
Other Tax Rates 2 (CIT rate for GST & PIT rate and PIT for CIT rate)	0.017 (0.018)	0.497*** (0.127)	-0.012 (0.013)
Lagged Shares	0.029*** (0.004)	0.353*** (0.027)	-0.041** (0.018)
Neighbors' Min Tax Rates (Average GST, PIT & CIT rates)	-0.007 (0.012)	-0.0003 (0.045)	-0.011 (0.02)
Neighbors' Expenditure Per Capita	-0.00005 (0.00004)	-0.0001 (0.0003)	-0.0001 (0.0001)
Home Border Population (percent)	-0.041*** (0.012)	-0.148 (0.093)	-0.008 (0.036)
Neighbors' Border Population (percent)	0.017 (0.026)	-0.313*** (0.098)	-0.1*** (0.038)
Neighbors' Border Income (percent)	-0.029 (0.016)	-0.064 (0.181)	-0.186*** (0.07)
Home Border Income (percent)	0.029* (0.016)	0.111 (0.121)	0.163*** (0.048)
House Republican (HRep)	-0.039 (0.05)	0.533 (0.388)	0.178 (0.157)
Senate Republican (SRep)	0.068 (0.059)	-1.54*** (0.37)	0.413*** (0.156)
Governor Republican (GRep)	-0.05 (0.03)	0.27 (0.24)	0.044 (0.095)
SHG Republican	0.076** (0.03)	-0.486* (0.286)	-0.114 (0.11)
Median Income	-0.0004*** (6.93E-6)	-0.0002*** (0.00005)	
Households with $ 100,000 or more		0.553*** (0.139)	
Travel Costs	0.041*** (0.013)		

The entries are regression coefficients with standard errors in parenthesis.
***, **, * indicates significance at the 0.01, 0.05, 0.10 confidence levels, respectively.

Table 17.
Three-Stage Least-Squares Regression Results for Tax Shares (Neighbors' Max Tax Shares)

Variable	GST (3SLS)	PIT (3SLS)	CIT(3SLS)
Intercept	33.21 (4.46)	19.37 (4.32)	10.61 (1.94)
Political Costs GST/PIT	-3.13*** (0.75)		
Political Costs GST/CIT	0.0009*** (0.0001)		
Political Costs PIT/GST		-0.236 (0.311)	
Political Costs PIT/CIT		-4.12E-6 (0.00009)	
Political Costs CIT/GST			-0.04 (0.16)
Political Costs CIT/PIT			-0.0003*** (0.00005)
Farm	-0.163 (0.145)	0.42*** (0.17)	0.12 (0.082)
Mining	0.82*** (0.142)	-0.023 (0.17)	-0.42*** (0.083)
Construction	-0.151 (0.124)	0.72*** (0.16)	0.108 (0.069)
Manufacturing	0.101* (0.057)	-0.022*** (0.07)	0.048 (0.033)
Transportation	-0.53** (0.26)	0.72** (0.30)	0.49*** (0.14)
Trade	-0.09 (0.098)	0.189 (0.12)	-0.30*** (0.05)
Finance	-0.031 (0.214)	-1.71*** (0.26)	0.48*** (0.11)
Population	4.91E-7*** (2.0E-7)	-1.61E-7 (2.4E-7)	-1.62E-7 (1.13E-7)
Prime Age	1.52E-8 (2.94E-8)	-3.29E-8 (3.29E-8)	1.54E-8 (1.7E-8)
State Personal Income PC	-0.007 (0.016)	-0.011 (0.02)	0.006 (0.009)
Expenditure PC	-0.0016*** (0.0004)	-0.001*** (0.0005)	-0.002*** (0.0002)
Neighbors' Max GST Share	-0.023 (0.026)		
Neighbors' Max PIT Share		0.065** (0.03)	
Neighbors' Max CIT Share			-0.003 (0.03)
GST Rate	0.56 (0.281)		
PIT Rate		0.226*** (0.038)	
CIT Rate			0.198** (0.10)

The entries are regression coefficients with standard errors in parenthesis.
***, **, * indicates significance at the 0.01, 0.05, 0.10 confidence levels, respectively.

Table 18.
Three-Stage Least-Squares Regression Results for Tax Rates
(Neighbors' Max Tax Rates)

Variable	GST Rate	PIT Rate	CIT Rate
Intercept	2.18 (0.627)	16.60 (4.34)	3.122 (1.76)
Other Tax Rates 1 (PIT for GST rate and GST for income tax rates)	-0.004 (0.003)	-0.01 (0.29)	0.19 (0.13)
Other Tax Rates 2 (CIT rate for GST & PIT rate and PIT for CIT rate)	0.054*** (0.016)	0.117*** (0.131)	-0.001 (0.013)
Lagged Shares	0.03*** (0.003)	0.418*** (0.027)	-0.035** (0.019)
Neighbors' Max Tax Rates (Average GST, PIT & CIT rates)	0.021 (0.029)	-0.007 (0.036)	-0.0001 (0.0001)
Neighbors' Expenditure Per Capita	-0.00002 (0.00004)	0.0001 (0.0003)	-0.0001 (0.0001)
Home Border Population (percent)	-0.044*** (0.012)	-0.198** (0.092)	-0.005 (0.037)
Neighbors' Border Population (percent)	0.03** (0.01)	-0.328*** (0.097)	-0.09*** (0.038)
Neighbors' Border Income (percent)	-0.036 (0.024)	-0.033 (0.179)	-0.186*** (0.07)
Home Border Income (percent)	0.034** (0.015)	0.153 (0.12)	0.126*** (0.048)
House Republican (HRep)	-0.047 (0.04)	0.411 (0.406)	0.223 (0.169)
Senate Republican (SRep)	-0.028 (0.05)	-1.18*** (0.36)	0.466*** (0.154)
Governor Republican (GRep)	-0.06* (0.03)	0.48** (0.23)	0.07 (0.096)
SHG Republican	0.06** (0.03)	-0.174 (0.286)	-0.129 (0.115)
Median Income	-0.00005*** (6.77E-6)	-0.0002*** (0.00005)	
Households with $ 100,000 or more		0.617*** (0.136)	
Travel Costs	0.047*** (0.013)		

The entries are regression coefficients with standard errors in parenthesis.
***, **, * indicates significance at the 0.01, 0.05, 0.10 confidence levels, respectively.

Table 19.
Three-Stage Least-Squares Regression Results for Tax Shares (House & Senate Jointly)

Variable	GST (3SLS)	PIT (3SLS)	CIT(3SLS)
Intercept	35.91 (4.36)	18.47 (3.69)	12.22 (2.09)
Political Costs GST/PIT	-3.21*** (0.75)		
Political Costs GST/CIT	0.0009*** (0.0001)		
Political Costs PIT/GST		-0.15 (0.26)	
Political Costs PIT/CIT		0.00009 (0.00008)	
Political Costs CIT/GST			-0.13 (0.17)
Political Costs CIT/PIT			-0.0003*** (0.00006)
Farm	-0.24* (0.14)	0.37*** (0.14)	0.09 (0.08)
Mining	0.85*** (0.14)	-0.06 (0.15)	-0.4*** (0.08)
Construction	-0.21* (0.12)	0.59*** (0.13)	0.09 (0.07)
Manufacturing	0.11** (0.05)	-0.18*** (0.06)	0.055 (0.035)
Transportation	-0.69*** (0.27)	0.62*** (0.26)	0.42*** (0.15)
Trade	-0.037 (0.09)	0.12 (0.1)	-0.29*** (0.06)
Finance	-0.084 (0.21)	-1.33*** (0.21)	0.54*** (0.12)
Population	4.8E-7*** (1.9E-7)	-6.45E-8 (2.06E-7)	-1.47E-7 (1.21E-7)
Prime Age	1.82E-8 (2.9E-8)	-1.13E-8 (3.03E-8)	1.78E-8 (1.8E-8)
State Personal Income PC	-0.007 (0.016)	-0.009 (0.017)	0.006 (0.01)
Expenditure PC	-0.001*** (0.0004)	-0.001** (0.0004)	-0.002*** (0.0002)
Neighbors' Min GST Share	-0.095*** (0.03)		
Neighbors' Max PIT Share		0.036** (0.02)	
Neighbors' Max CIT Share			-0.035 (0.03)
GST Rate	0.61*** (0.26)		
PIT Rate		0.16*** (0.03)	
CIT Rate			0.40*** (0.1)

The entries are regression coefficients with standard errors in parenthesis.
***, **, * indicates significance at the 0.01, 0.05, 0.10 confidence levels, respectively.

Table 20.
Three-Stage Least-Squares Regression Results for Tax Rates
(House & Senate Jointly)

Variable	GST Rate	PIT Rate	CIT Rate
Intercept	3.54 (0.59)	17.39 (4.08)	3.04 (1.69)
Other Tax Rates 1 (PIT for GST rate and GST for income tax rates)	-0.003 (0.003)	0.116 (0.23)	0.14 (0.1)
Other Tax Rates 2 (CIT rate for GST & PIT rate and PIT for CIT rate)	0.037*** (0.015)	0.11 (0.12)	-0.01 (0.01)
Lagged Shares	0.028*** (0.003)	0.36*** (0.02)	-0.048** (0.018)
Neighbors' Tax Rates (The Lowest for GST and the Highest for PIT & CIT rates)	-0.003 (0.01)	0.015 (0.035)	-0.04 (0.03)
Neighbors' Expenditure Per Capita	-0.00005 (0.00004)	-0.00002 (0.0003)	-0.0001 (0.0001)
Home Border Population (percent)	-0.028** (0.011)	-0.171** (0.089)	-0.004 (0.036)
Neighbors' Border Population (percent)	0.23** (0.012)	-0.24*** (0.09)	-0.11*** (0.03)
Neighbors' Border Income (percent)	-0.028 (0.023)	-0.001 (0.17)	-0.193** (0.07)
Home Border Income (percent)	0.014 (0.015)	0.142 (0.11)	0.147*** (0.048)
House & Senate Republican (HSRep)	-0.125* (0.05)	-0.181 (0.39)	0.194 (0.173)
Governor Republican (GRep)	-0.057* (0.03)	0.48** (0.23)	0.022 (0.09)
SHG Republican	0.05* (0.03)	-0.09 (0.27)	-0.143 (0.112)
Median Income	-0.00004*** (6.6E-6)	-0.0002*** (0.00005)	
Households with $ 100,000 or more		0.57*** (0.13)	
Travel Costs	0.02* (0.013)		

The entries are regression coefficients with standard errors in parenthesis.
***, **, * indicates significance at the 0.01, 0.05, 0.10 confidence levels, respectively.

Table 21.
Three-Stage Least-Squares Regression Results for Tax Shares (New Political Cost Variable)

Variable	GST (3SLS)	PIT (3SLS)	CIT(3SLS)
Intercept	38.88 (4.57)	22.46 (3.63)	10.55 (1.94)
Political Costs GST (variability of GST)	-0.69 (0.56)		
Political Costs PIT (variability of PIT)		-2.06*** (0.269)	
Political Costs CIT (variability of CIT)			-0.737*** (0.118)
Farm	-0.155 (0.155)	0.324** (0.149)	-0.031 (0.083)
Mining	0.98*** (0.15)	-0.196 (0.156)	-0.409*** (0.082)
Construction	-0.295** (0.136)	0.531*** (0.142)	0.089 (0.069)
Manufacturing	0.083 (0.062)	-0.278*** (0.061)	0.056* (0.033)
Transportation	-0.87*** (0.301)	0.713*** (0.264)	0.42*** (0.14)
Trade	0.047 (0.107)	0.266*** (0.103)	-0.34*** (0.05)
Finance	-0.237 (0.225)	-1.571*** (0.224)	0.556*** (0.119)
Population	5.5E-7*** (2.1E-7)	-2.2E-7 (2.1E-7)	-1.65E-7 (1.18E-7)
Prime Age	1.59E-8 (3.1E-8)	-3.2E-9 (3.1E-8)	1.51E-8 (1.76E-8)
State Personal Income PC	-0.01 (0.017)	-0.006 (0.017)	0.006 (0.009)
Expenditure PC	-0.0018*** (0.0005)	-0.001*** (0.0004)	-0.002*** (0.0002)
Neighbors' Max GST Share	-0.113*** (0.037)		
Neighbors' Max PIT Share		0.063** (0.02)	
Neighbors' Max CIT Share			-0.011 (0.03)
GST Rate	1.105*** (0.36)		
PIT Rate		0.149*** (0.04)	
CIT Rate			0.106 (0.09)

The entries are regression coefficients with standard errors in parenthesis.
***, **, * indicates significance at the 0.01, 0.05, 0.10 confidence levels, respectively.

Table 22.
Three-Stage Least-Squares Regression Results for Tax Rates
(New Political Cost Variable)

Variable	GST Rate	PIT Rate	CIT Rate
Intercept	3.88 (0.58)	25.25 (4.61)	2.67 (1.74)
Other Tax Rates 1 (PIT for GST rate and GST for income tax rates)	-0.006 (0.004)	-0.025 (0.213)	0.27*** (0.087)
Other Tax Rates 2 (CIT rate for GST & PIT rate and PIT for CIT rate)	0.019 (0.021)	0.764*** (0.147)	0.01 (0.011)
Lagged Shares	0.026*** (0.003)	0.395*** (0.028)	-0.008 (0.019)
Neighbors' Max Tax Rates (Average GST, PIT & CIT rates)	0.003 (0.01)	-0.027 (0.038)	-0.063* (0.036)
Neighbors' Expenditure Per Capita	-0.00002 (0.00004)	0.0005 (0.0004)	-0.0002 (0.0001)
Home Border Population (percent)	-0.031*** (0.011)	-0.239** (0.099)	-0.004 (0.037)
Neighbors' Border Population (percent)	0.018 (0.011)	-0.392*** (0.104)	-0.092*** (0.039)
Neighbors' Border Income (percent)	-0.039* (0.023)	0.0355 (0.193)	-0.145** (0.07)
Home Border Income (percent)	0.02** (0.015)	0.179 (0.129)	0.101** (0.049)
House Republican (HRep)	-0.033 (0.046)	0.4 (0.393)	0.181 (0.155)
Senate Republican (SRep)	-0.022 (0.058)	-0.57 (0.4)	0.494*** (0.16)
Governor Republican (GRep)	-0.067** (0.03)	0.76** (0.25)	0.078 (0.096)
SHG Republican	0.06** (0.03)	0.081 (0.33)	0.093 (0.129)
Median Income	-0.00005*** (6.54E-6)	-0.0003*** (0.00005)	
Households with $ 100,000 or more		0.569*** (0.143)	
Travel Costs	0.023*** (0.013)		

The entries are regression coefficients with standard errors in parenthesis.
***, **, * indicates significance at the 0.01, 0.05, 0.10 confidence levels, respectively.

VITA

Sanela Porca was born in Zenica, Bosnia and Herzegovina on July 19, 1969. She attended elementary and secondary school in Zenica, Bosnia and Herzegovina. She started her undergraduate study at the University of Sarajevo, Bosnia and Herzegovina in 1989. Unfortunately, the aggression on Bosnia and Herzegovina in 1992 prevented her from getting her Bachelor Degree in economics from the University of Sarajevo. Sanela came to the United States of America in 1994. She came to this country from war-torn Bosnia to continue her education. She attended Denison University in Granville, OH and in May of 1996, she received the Bachelor of Arts in Economics. She also attended Miami University in Oxford, OH and received the Master of Arts in Economics in August of 1997.

Sanela entered the Doctoral program in Economics at the University of Tennessee, Knoxville in August of 1997. While at the University of Tennessee, Sanela worked as a graduate research assistant for the Center for Business and Economic Research and as a graduate teaching assistant for the Department of Economics. Sanela defended her dissertation in June, 2002 and received the doctoral degree in August, 2002. Sanela has accepted a position at the University of South Carolina Aiken as an Assistant Professor of economics. She will be teaching at the University of South Carolina Aiken School of Business Administration.